The Apple IIc

Apple Presents the Apple IIc
An Interactive Owner's Guide

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Warning

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

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Radio Frequency Interference Statement

The equipment described in this manual generates and uses radio-frequency energy. If it is not installed and used properly, that is, in strict accordance with our instructions, it may cause interference with radio and television reception.

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Subpart J, Part 15, of FCC rules. These rules are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that the interference will not occur in a particular installation, especially if you use a "rabbit ear" television antenna. (A "rabbit ear" antenna is the telescoping-rod type usually contained on TV receivers.)

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer or its peripheral devices. To further isolate the problem:

- Disconnect the peripheral devices and their input/output cables one at a time. If the interference stops, it is caused by either the peripheral device or its I/O cable. These devices usually require shielded I/O cables. For Apple peripheral devices, you can obtain the proper shielded cable from your dealer. For non-Apple peripheral devices, contact the manufacturer or dealer for assistance.

If your computer does cause interference to radio or television reception, you can try to correct the interference by using one or more of the following measures:

- Turn the TV or radio antenna until the interference stops.
- Move the computer to one side or the other of the TV or radio.
- Move the computer farther away from the TV or radio.
- Plug the computer into an outlet that is on a different circuit than the TV or radio. (That is, make certain the computer and the radio or television set are on circuits controlled by different circuit breakers or fuses.)
- Consider installing a rooftop television antenna with coaxial cable lead-in between the antenna and TV.

If necessary, you should consult your dealer or an experienced radio/television technician for additional suggestions. You may find helpful the following booklet, prepared by the Federal Communications Commission:

"How to Identify and Resolve Radio-TV Interference Problems."

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, stock number 004-000-00345-4.

Welcome to Apple

When you chose an Apple® IIc, you chose more than a machine. You chose a philosophy—that using a computer is fun. Sure, you can use your Apple® IIc for all sorts of serious purposes, from balancing your books to tracking your investments, but there's no reason why you can't enjoy yourself while you're at it.

Learning to use a computer should be part of the fun—and it is fun with the *Interactive Owner's Guide,* a hands-on introduction to the Apple IIc.

What You'll Learn

This hands-on guide will help you get comfortable with your Apple IIc. The guide will

- introduce you to the fundamentals of using the computer
- demonstrate some of the things you can do with your computer—like writing letters and balancing your budget
- introduce you to programming—the fine art of talking to the computer in its own language.

The guide won't teach you how to set up your computer, so read *Setting Up Your Apple IIc* before you read this book.

How You'll Learn

An **interactive guide** combines book, disk, and the computer for personal instruction.

This guide has a unique way of teaching you about the Apple IIc. You learn by interacting with the computer—that's why it's called an **interactive guide.** The instructions that turn your Apple IIc into a private tutor are recorded on the disks that came with this guide.

The book is a bridge between topics covered on the disks and a reference to what you see on the screen, but most of your learning will come from hands-on experience.

Go through the guide at your own pace. Learning with a computer is different from learning in a classroom—you don't have to wait for a bell to take recess. And don't feel as if you have to master everything in one pass. The guide won't self destruct after the first go-around. You can go through it until you're comfortable with the material and then come back to it any time you need a refresher course.

Who Should Read It

This book is designed primarily for newcomers to the Apple II family of computers. If you're a first-time user, chase any veterans out of the room so you can go through the book and disks alone. It's a personal computer after all, and learning to use it should be a personal experience.

If you've used other models of the Apple II, a lot of what you know will apply to the Apple IIc. If you decide to skim through the book, use the summaries at the end of each chapter to make sure you haven't missed anything. Even experienced users will find this guide helpful. If you're one of these people:

- Go through *Apple Presents the Apple IIc: An Introduction.*
- Read Appendix C, which describes differences between the Apple IIc and other models of the Apple II.
- Read *System Utilities*, the booklet that describes the utilities for the Apple IIc.

Who Shouldn't Read It: This book is not a technical reference manual. If you're looking for memory addressing maps, firmware listings, timing charts, and the like, ask your Apple dealer for the *Apple IIc Reference Manual.*

Once you've mastered the material in the guide, you'll be a competent, confident, full-fledged member of the Apple corps, but you won't know everything there is to know about computers.

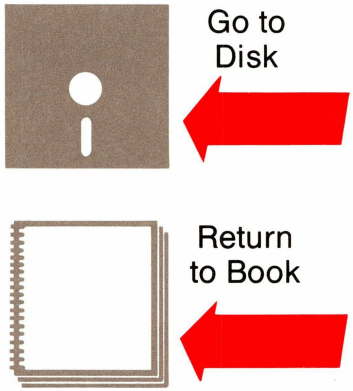
Learning to use a computer is like learning to drive a car—your skill grows with your time behind the wheel. This guide will get you started; you'll learn about the brakes and the gas pedal, but you won't be ready for rush hour traffic. That comes with practice.

Where you go from here is up to you. You may decide to pick up another manual and learn to write programs. You may want to learn to use your computer for correspondence, budgeting, or keeping track of your jogging times and distances. One thing's for sure, your learning won't end with this book because there is no limit to what you can do with your Apple.

Whatever you do, relax and have a good time.

How It Works

Figure P-1. *Disk/Book Symbols*



As you explore this guide, you'll come to symbols shown in Figure P-1.

The first symbol means "go to the disk" for some hands-on experience. The second symbol means "return to the book" for a recap of what you learned on the disk and for related information.

Look for these other visual cues throughout the manual:

By the Way: Gray boxes contain sidelights or interesting pieces of information. Read the boldface tag to decide if you want to read the box.

Important! Gray boxes like this contain important information.

Warning
Boxes like this indicate potential problems or disasters.

Computer jargon is boldfaced when it is introduced. Sometimes additional information about the term is in the margin; the term is always defined in the glossary.

You also will see a special typeface used for what you type:

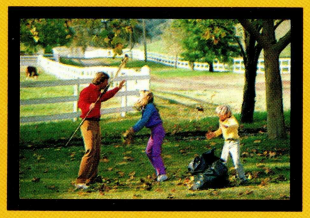
```
it looks like this.
```

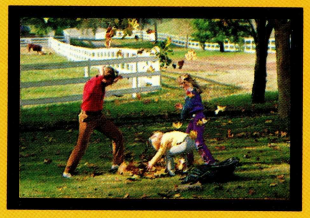
Keys look like this: ←, ⌘, RETURN. When you see a hyphen joining two keys, it means to press them simultaneously. For instance, ⌘-CONTROL-RESET means all three keys should be pressed at the same time.

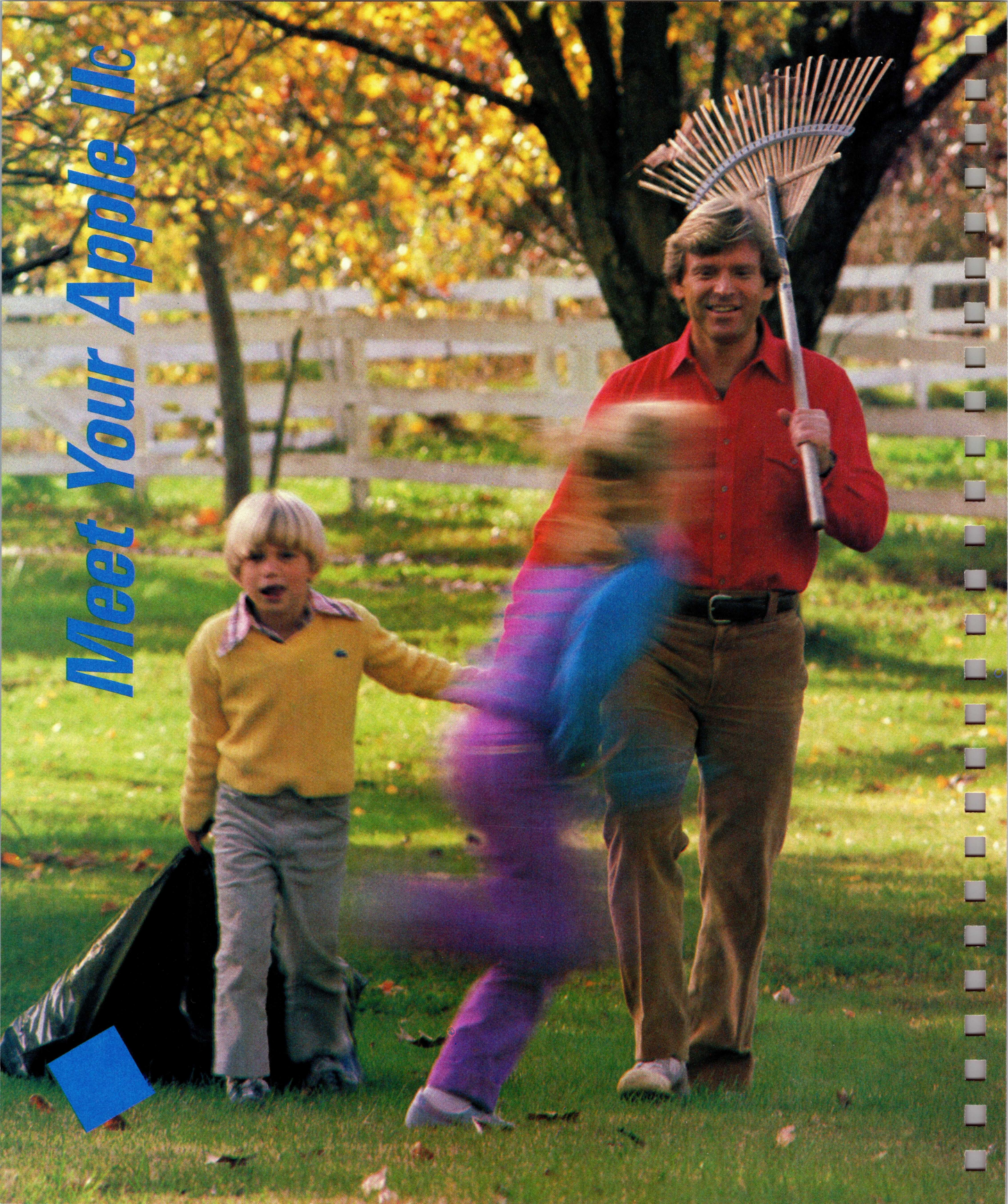
FYI means *for your information.*

You'll also notice that some information is labeled **FYI** and is in italics. This information is optional reading—it's related to the information in the main text, but it's not vital to your understanding.

Chapter 1

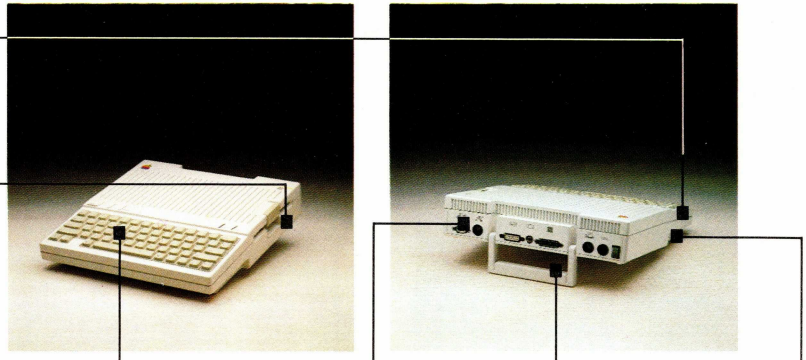





Meet Your Apple IIc

Sit down in front of your Apple IIc, and take a minute to identify the major parts that make up your computer (Figure 1-1).

Figure 1-1. *The Apple IIc*



Volume Control Knob: Lets you adjust the volume of the built-in speakers.

Built-in Disk Drive: Reads information from and writes information to disks, much the way a tape recorder plays and records music on a magnetic tape.

Keyboard: Your primary means of communicating with the computer.

Ports: Connectors for attaching a printer, and other accessories, to the Apple IIc.

Handle: For carrying the Apple IIc and for propping it up into a comfortable typing position.

Headphone Jack: Allows you to attach headphones to the computer.

Important! Always prop the handle up under the Apple IIc when you are using the computer. It makes typing more comfortable and, most important, provides good circulation around the computer.

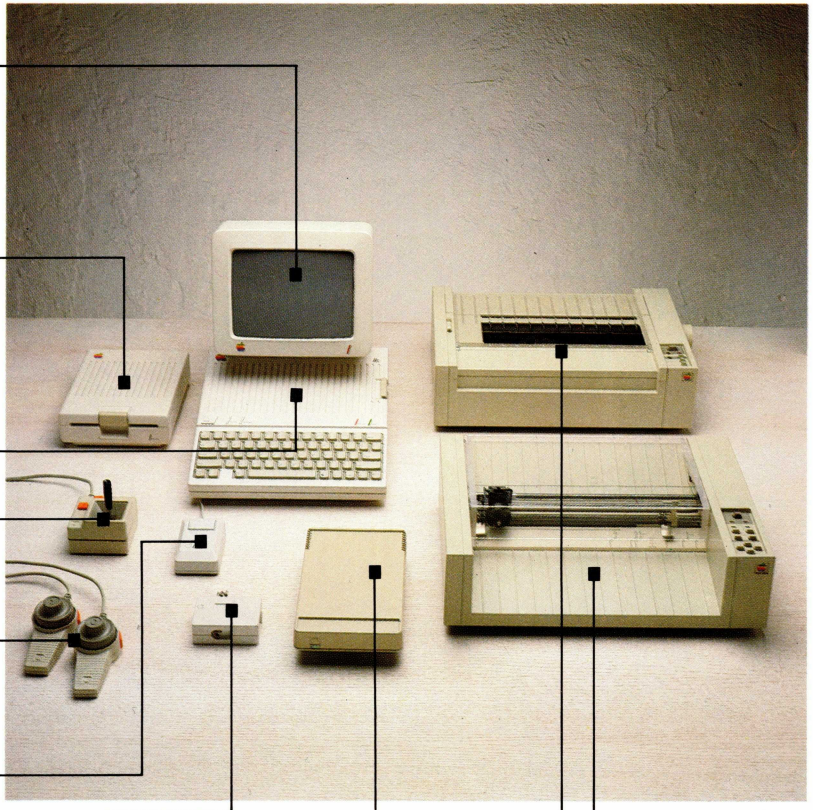
The Cast of Characters

Some **peripheral devices** are built into the computer—like the disk drive, the speaker, and the keyboard. Other devices can be attached to the computer by cable—like the printer.

A **display device** is the bridge between you and your computer. It *displays* information.

Figure 1-2 shows the Apple IIc with a variety of accessories, known as **peripheral devices.** While there are lots of peripheral devices you can use with your Apple IIc, for purposes of the guide you need only two: the disk drive that's built into the computer and a video monitor or television set to use as a **display device.**

Figure 1-2. *The Apple IIc Computer System*



Video Monitor or Television Set (With RF Modulator): Displays what you type and messages from the computer.

External Disk Drive: Reads information from and writes information to disks, just like the built-in disk drive.

Computer: Processes the information you put into it.

Hand Controls and Joystick: Control movement of creatures or objects around the screen in some game programs.

Mouse: Moves a marker across the screen in some programs.

RF Modulator: Makes it possible for a TV set to tune in signals from the computer.

Modem: Lets you communicate with other computers by phone.

Printer: Prints information from the computer on paper.

Plotter: Draws charts and graphs created with the computer on paper.

You'll learn more about printers, modems, and other devices you can hook up to your computer in Chapter 5.

FYI: Input and Output

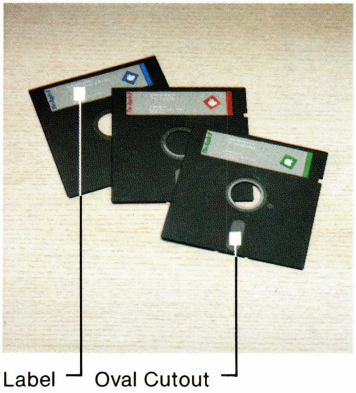
*You may hear the terms **input** and **output** applied to peripheral devices. An input device is one that carries information into the computer (like the keyboard). An output device is one that carries information out of the computer (like the monitor). A disk drive is both an input and an output device because it loads programs into the computer and it saves information from the computer to disks for storage.*

Input and output is abbreviated I/O. If you see the message `I/O ERROR` *on your screen, it means there was a problem with the exchange of information between the computer and one of the peripheral devices. You can usually guess what the problem is based on what you were doing when the message appeared. If you were printing something, the problem is the connection between the computer and the printer. If you were loading something from or saving something to a disk, the problem is with the disk drive.*

Computer Programs

What you do with your computer system depends on the programs (or instructions) that you put into it. Programs are stored on **flexible disks** sometimes called **floppy disks.** (See Figure 1-3.)

Figure 1-3. *Flexible Disks*



Disks are to disk drives what records are to record players. Some disks have information already recorded on them, others are completely blank (so you can use them to store your information).

The computer, the printer, and other devices are called **hardware.** Computer programs are called **software.**

Handle With Care

The Apple IIc isn't made of porcelain—so handle it with care, but not with kid gloves. You can't break it by pressing the wrong key. You also can't break it by typing too vigorously. But one thing the Apple IIc can't stand is immersion in coffee, soda, or Jacuzzi. If you have one rule in the computer room, make it this one: "No drinking on the job."

Your disks are the most fragile part of the computer system. The next section shows you the correct way to put a disk in the disk drive. You'll find further tips on disk handling in "FYI: Disks" later in this chapter.

Putting a Disk in a Disk Drive

An Introduction is on the flip side of *The Apple at Play.*

Find the disk labeled *An Introduction.* This disk will introduce you to the special keys on the Apple IIc keyboard and to some concepts and procedures that are common to hundreds of other Apple II programs. It's a great way to get your feet wet.

Just follow these steps.

1. Push in on the built-in disk drive door and it will pop up. See Figure 1-4. (If the cardboard packing material is still inside the drive, gently pull it out and throw it away. From now on, the only thing you should put inside your disk drive is a disk.)
2. Put *An Introduction* in the disk drive as shown in Figure 1-5. Make sure the correct label is facing up and that the oval cutout on the disk enters the disk drive first.

Figure 1-4. *Open the Disk Drive*

Figure 1-5. *Put the Disk in the Disk Drive*

Figure 1-6. *Close the Disk Drive*

Figure 1-7 *Turn On Your Monitor or Your Television Set*

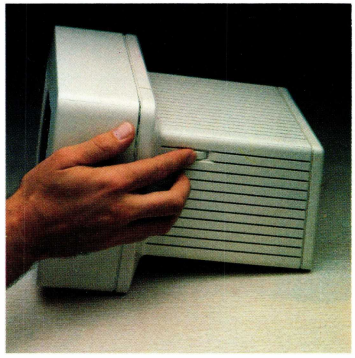
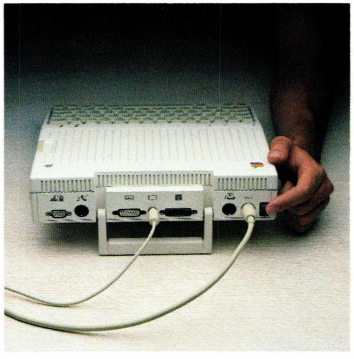


Figure 1-8. *Turn On the Power*



3. When the disk is all the way inside the disk drive, push down on the door until it clicks shut. See Figure 1-6. This is important. If you forget to push down the door, the program won't run.
4. Turn on your video monitor or television set. See Figure 1-7.

Important! If you're using a television set, make sure the 80/40 Column switch on your Apple IIc (above the keyboard on the left) is set to 40 (the down position), that the channel selector on your television is set according to the instructions in *Setting Up Your Apple IIc* (channel 3 or 4), and that the slide switch on the back of the modulator is set correctly.

If you're using a monitor, make sure the 80/40 Column switch is set to 80 (the up position).

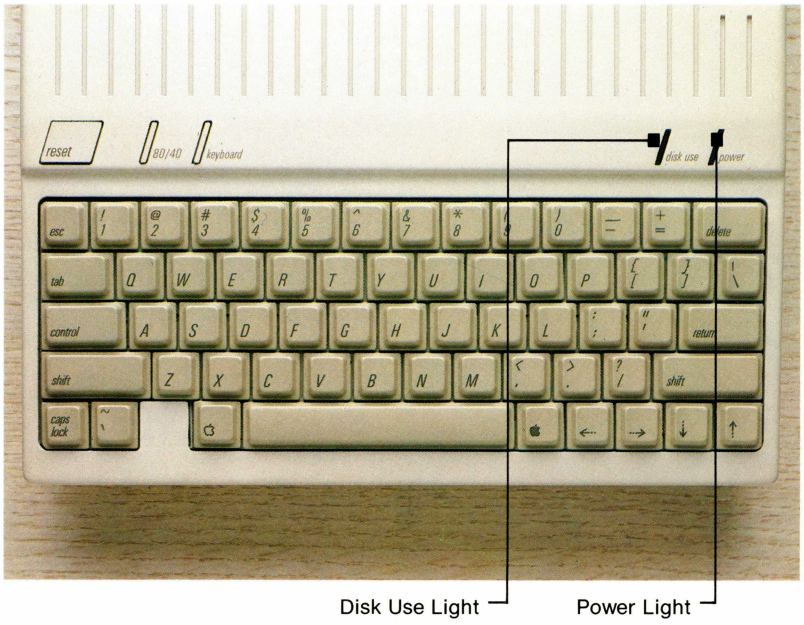
For more information, see "Lights and Switches" later in this chapter.

5. Reach around the left side of the computer and find the green switch in the lower-left corner. Press it to turn on the power of the Apple IIc. See Figure 1-8.

When you turn on the power, four things should happen:

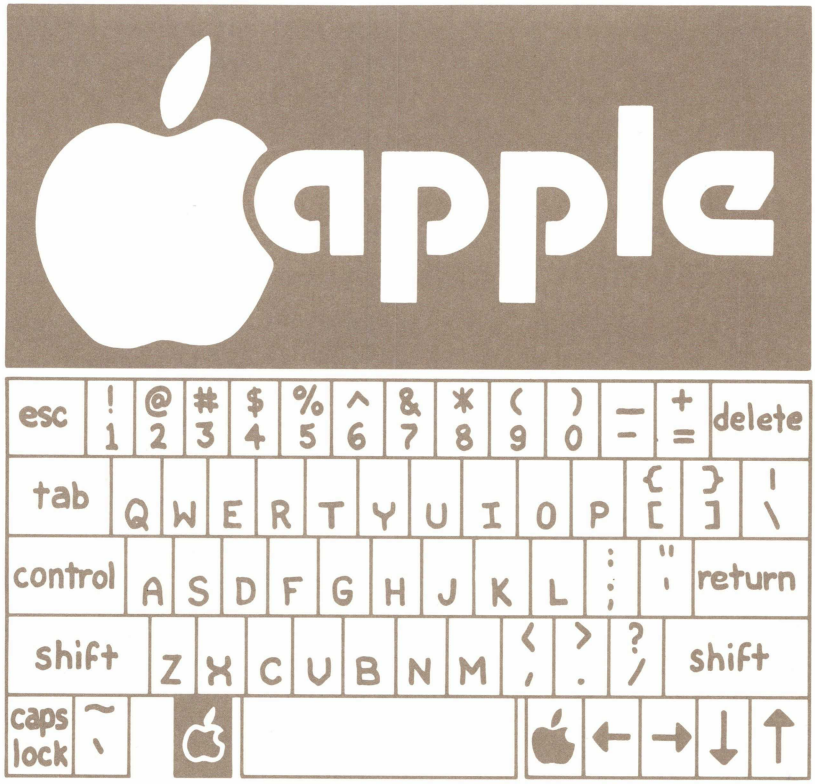
- You'll hear a beep.
- The Power light (on the right above the keyboard) will light up.
- The Disk Use light (to the left of the Power light) will come on.
- You'll hear a whirring sound coming from your built-in disk drive.

Figure 1-9. *Starting Up*



Your screen will look like Figure 1-10:

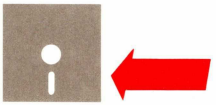
Figure 1-10. *The Opening of* An Introduction



Too Loud? Too Soft? If you don't hear any sounds or if the sound is too loud, adjust the volume control knob on the lower-left side of the Apple IIc.

Double-Sided Disks: Notice that information is recorded on both sides of the disks packed with this guide. These disks are certified for double-sided use. Most disks are designed for single-sided use (the disk drive uses only one side of the disk). Do not attempt to use both sides of a disk unless that disk is certified for double-sided use—most disks are not.

Hands On—An Introduction



Put this book aside for a while and learn to use your Apple IIc by following the instructions on the screen. Mark your place so you remember to come back here when you're finished.

FYI: Got a Problem?

If your screen doesn't look like Figure 1-10, do this:

- *Check to make sure you have the right disk.*
- *Check to make sure the disk is right side up.*

Then turn off the power and go back to "Putting a Disk in a Disk Drive."

If you don't see anything on the screen, do this:

- *Make sure the monitor is turned on, plugged into the wall, and plugged into the computer.*
- *Try adjusting the monitor's contrast knob.*
- *If you're using a television, make sure the selector is set to the correct channel. Make sure the modulator is installed according to the instructions in* Setting Up Your Apple IIc.

If you get the message CHECK DISK DRIVE, *do this:*

- *Make sure the disk drive door is down. If it's not, push it down.*
- *If your disk drive door isn't the problem, you probably put the wrong disk in the disk drive or forgot to put any disk at all in the disk drive. Put in the correct disk.*

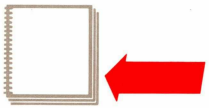
Then turn off the power and go back to "Putting a Disk in a Disk Drive."

If you get the message I/O ERROR, *do this:*

- *Slide the disk partially out of the disk drive and make sure it's the disk labeled* An Introduction *and that the oval cutout entered the disk drive first. If you had the wrong disk in the disk drive or if you had the correct disk inserted the wrong way, put the correct disk in the disk drive (oval cutout first), turn off the power, then turn it on again.*

If these steps don't solve the problem, consult the troubleshooting appendix. If you can't find the answer there, contact your dealer.

More About the Apple IIc

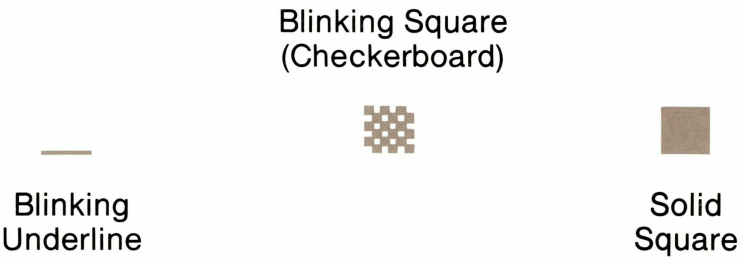


Welcome back. Take *An Introduction* out of the built-in disk drive and put it back in its paper envelope for safekeeping, but leave the Apple IIc turned on. You'll be using it again after this quick review.

The Cursor

The cursor marks your place on the screen. It's usually a blinking underline, but it can also be a blinking or solid square. See Figure 1-11.

Figure 1-11. *The Three Cursors*



You move the cursor using the arrow keys on the keyboard. What happens when you move the cursor depends on the program you're using. In some programs, moving the cursor to the left erases every character in the cursor's path. In other programs, the cursor moves over characters without erasing them. The quickest way to find out how a cursor works is to experiment by pressing DELETE, ←, →, ↑, and ↓.

The Keyboard

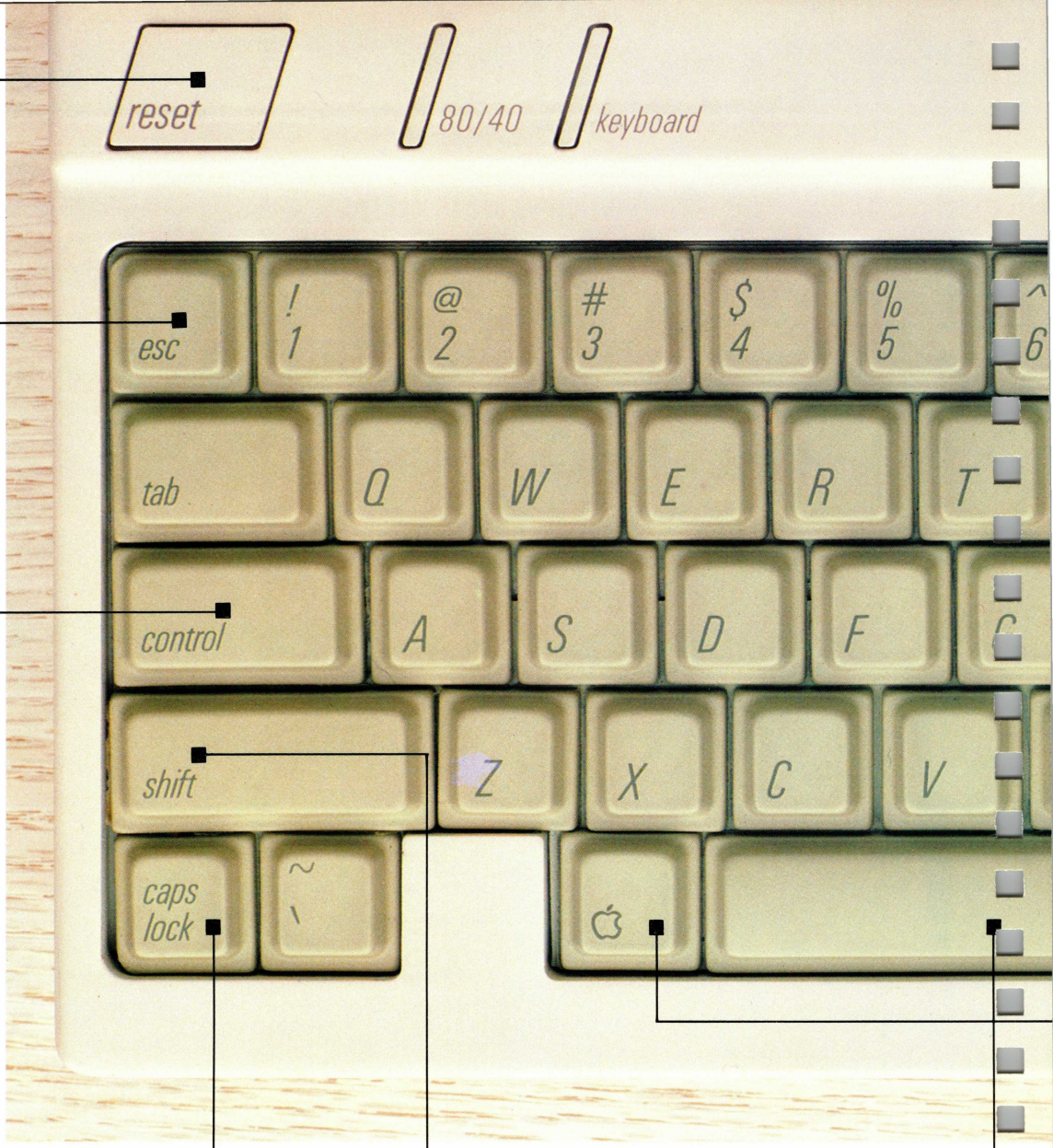
As you discovered in *An Introduction,* the Apple IIc keyboard is a little different from the keyboard on your run-of-the-mill typewriter. For one thing, it has got a bunch of keys that typewriters don't have. These keys are highlighted in Figure 1-12.

But even the keys that look like typewriter keys can behave differently. In some game programs, you might press letter keys to make your electronic quarterback throw a forward pass. It's up to the programmer to determine how the keys work. Fortunately, most programs follow certain rules.

When you press this key while holding down CONTROL, it causes some programs to restart (and you lose any data you were working with).

Pressing this key usually gets you back to the previous menu. *ESC* is short for *escape.*

Pressing this key by itself has no effect. It's used to make other keys work differently. When you see CONTROL-G, the hyphen joining the two keys means to hold down CONTROL while you press G.



When this key is locked down, all the letters you type are capitalized, but no other keys are affected. So you can type uppercase letters and still type numbers.

Press this key to get uppercase letters and the upper character on two-character keys. It works just like the typewriter shift key.

Press the SPACE bar to insert space characters. That's right, to the computer a space is a character.

The Open-Apple and Solid-Apple keys make other keys work differently (like CONTROL).

Typists sometimes use the letters *L* and *O* interchangeably with the numbers *1* and *0*. You can't do that on a computer.

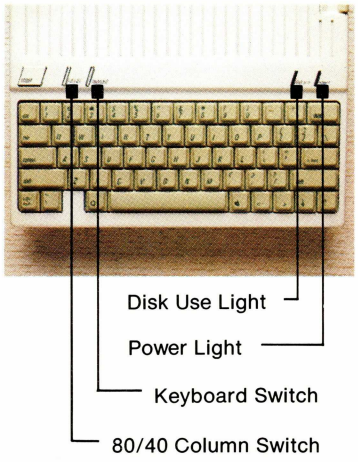
The arrow keys move the cursor around the screen.

Pressing this key means you're ready to proceed.

Some programs use this key to erase characters to the left of the cursor.

Figure 1-12. *The Keyboard of the Apple IIc. The special keys are highlighted.*

Figure 1-13. Lights and Switches



Lights and Switches

You should also be aware of the switches and lights located just above the keyboard. Figure 1-13 shows the Power light, the Disk Use light, the 80/40 Column switch, and the Keyboard switch

- The Power light is on when the computer's power is on.

  Make sure the Power light is off before plugging any devices into the computer.

- The Disk Use light comes on when the built-in disk drive is reading information from a disk or writing information on a disk. Don't open the disk drive while this light is on.

- The 80/40 Column switch determines whether your screen will display 40 or 80 characters across. You must set the switch before turning on the computer.

  Monitors produce sharper images (have better resolution) than televisions, so they can display 80 characters (letters, numbers, and so on) across. Televisions can clearly display only 40 characters across.

  When the switch is down, it's set to 40 columns—the correct setting for televisions. When the switch is up, it's set to 80 columns—the correct setting for monitors. Once you set the switch, you shouldn't have to change the setting, unless you alternate between using a monitor and a television.

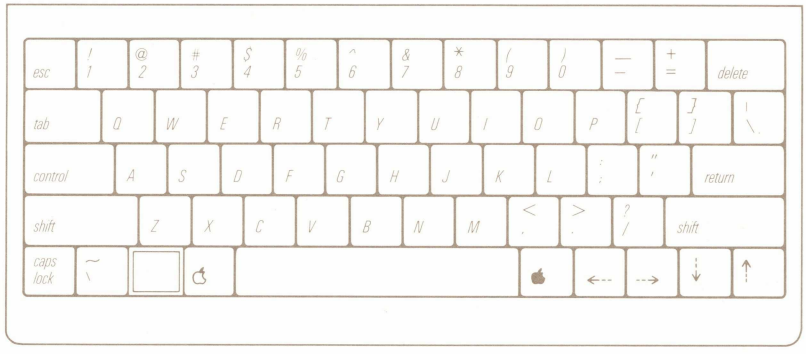
  Some programs require an 80-column display. Some programs are designed to display only 40 columns and will show up as 40 columns whether your switch is set to 80 or not.

- The Keyboard switch alternates between two keyboard layouts: the standard keyboard and the Dvorak keyboard.

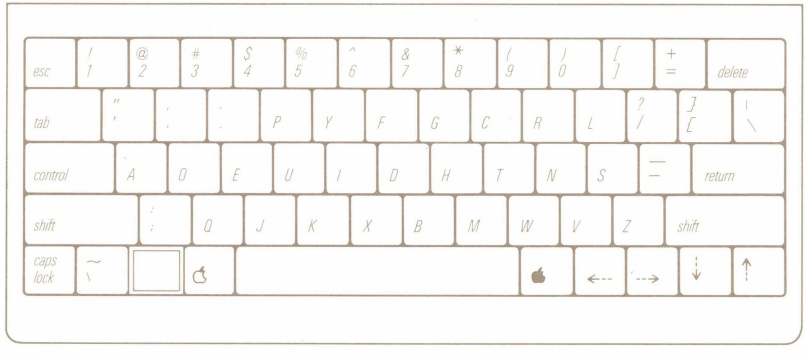
  Pressing down the Keyboard switch gives you the Dvorak keyboard, also known as the American simplified keyboard. You'll know the Keyboard switch is set to the Dvorak keyboard if, for example, you type the letter *S* and the letter *O* appears on the screen.

  The simplified keyboard was designed by August Dvorak to increase typing speed and efficiency by locating frequently used keys in the home-base row. See Figure 1-14.

Figure 1-14. *The Standard Keyboard and the Dvorak (Simplified) Keyboard*



Standard



Dvorak

What Now?

At this point you have several options:

- You can take a break.
- You can apply what you've learned to using the games and programs on *The Apple at Play* (or any game programs you have).
- You can go to Chapter 2 and learn how to use ready-made programs.
- You can go to Chapter 3 and learn about the inner workings of the computer.
- You can go to Chapter 4 and learn how to write your own programs.

But before you go off on your own, you need to know three things: how to start up the Apple IIc when the power is off, how to start up the Apple IIc when the power is on, and how to turn off the power when you've finished using the computer for the day.

Starting Up

Starting up is sometimes called **booting.** Don't let the jargon throw you—it all means the same thing.

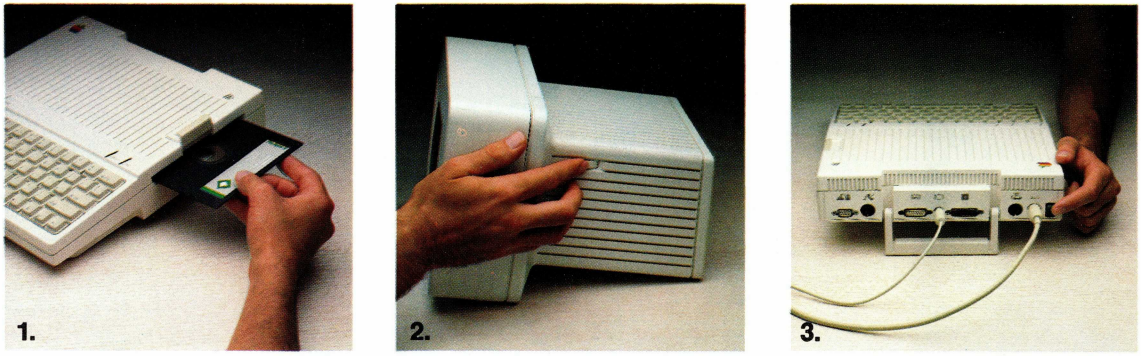
A **startup disk** is a disk with one or more programs on it that starts automatically. All the disks that are part of the guide and most commercially available programs are startup disks.

There are two ways to **start up** the Apple IIc. You already know how to start up the Apple IIc when the power is off:

1. Put a **startup disk** in the built-in disk drive, also known as drive 1.
2. Turn on the monitor.
3. Turn on the power.

These steps are illustrated in Figure 1-15.

Figure 1-15. *Starting Up With the Power Off*



Important! If you turn off the computer and then decide to turn it on again, be sure to wait 15 seconds.

Starting Up With the Power On

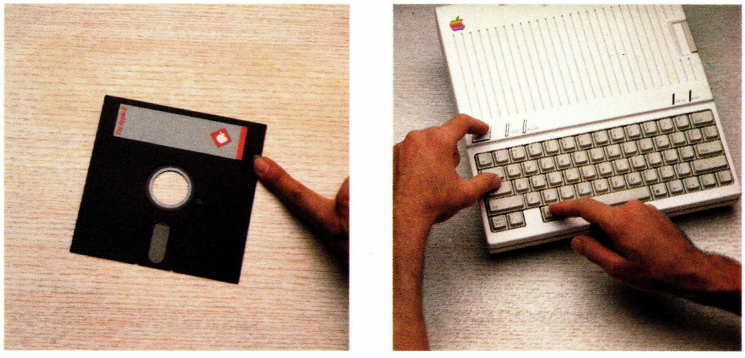
To start up when the power is already on:

1. Make sure the Disk Use light is off.
2. Take the last disk you were using out of the built-in disk drive, also known as drive 1.
3. Put the disk you want to start up into the built-in disk drive and close the drive door.
4. Hold down ⌘ and CONTROL while you press RESET, then release all three keys. (If it seems a little awkward, you're doing it right. If it were more convenient, you might do it accidentally.)

This method—pressing ⌘-CONTROL-RESET—is also known as **restarting** your computer.

These steps are illustrated in Figure 1-16.

Figure 1-16. *Starting Up With the Power On*



Start or Restart? Restarting is almost like turning the computer off and then on. But it's easier on the power switch. So if the power is already on, restart your computer by pressing ⌘-CONTROL-RESET.

Stopping the Computer

To turn off the computer:

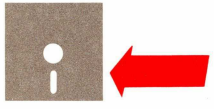
1. Make sure the Disk Use light is off.
2. Turn off the monitor or television.
3. Turn off the Apple IIc power switch.

Important! If you turn off the computer and then decide to turn it on again, be sure to wait 15 seconds.

By the Way: The computer uses less power than a 100-watt light bulb, so you don't need to turn it off for 20-minute coffee breaks.

Hands On—The Apple at Play

You'll find *The Apple at Play* on the flip side of *An Introduction.*



If you want to use the programs on *The Apple at Play,* put it in the built-in disk drive and start up the Apple IIc. Make sure the side labeled *The Apple at Play* is facing up when you put it in the built-in disk drive. If you don't remember how to start up, review the instructions in "Starting Up" and "Starting Up With the Power On."

The Real World: The programs on *The Apple at Play* disk are not simulations. They are actual programs. They are included in the guide to give you a taste for the real world. Like real world programs, each program on *The Apple at Play* works a little differently. Read each program's instructions carefully. If you get stuck, don't worry about it. You can restart the disk by pressing (Apple) - (CONTROL) - (RESET).

Your screen should look like Figure 1-17.

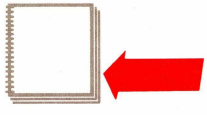
Figure 1-17. The Apple at Play *Menu*

```
        The Apple at Play Menu
_____________________________________

1.   <INTRODUCTION>

2.   Apple 21

3.   Financial Tools

4.   Lemonade

5.   Music Recital

6.   Space Quarks

7.   Quick Quiz

8.   Quit

Type a number, or select with the UP or
DOWN ARROW key.  Then press RETURN.

_____________________________________
```

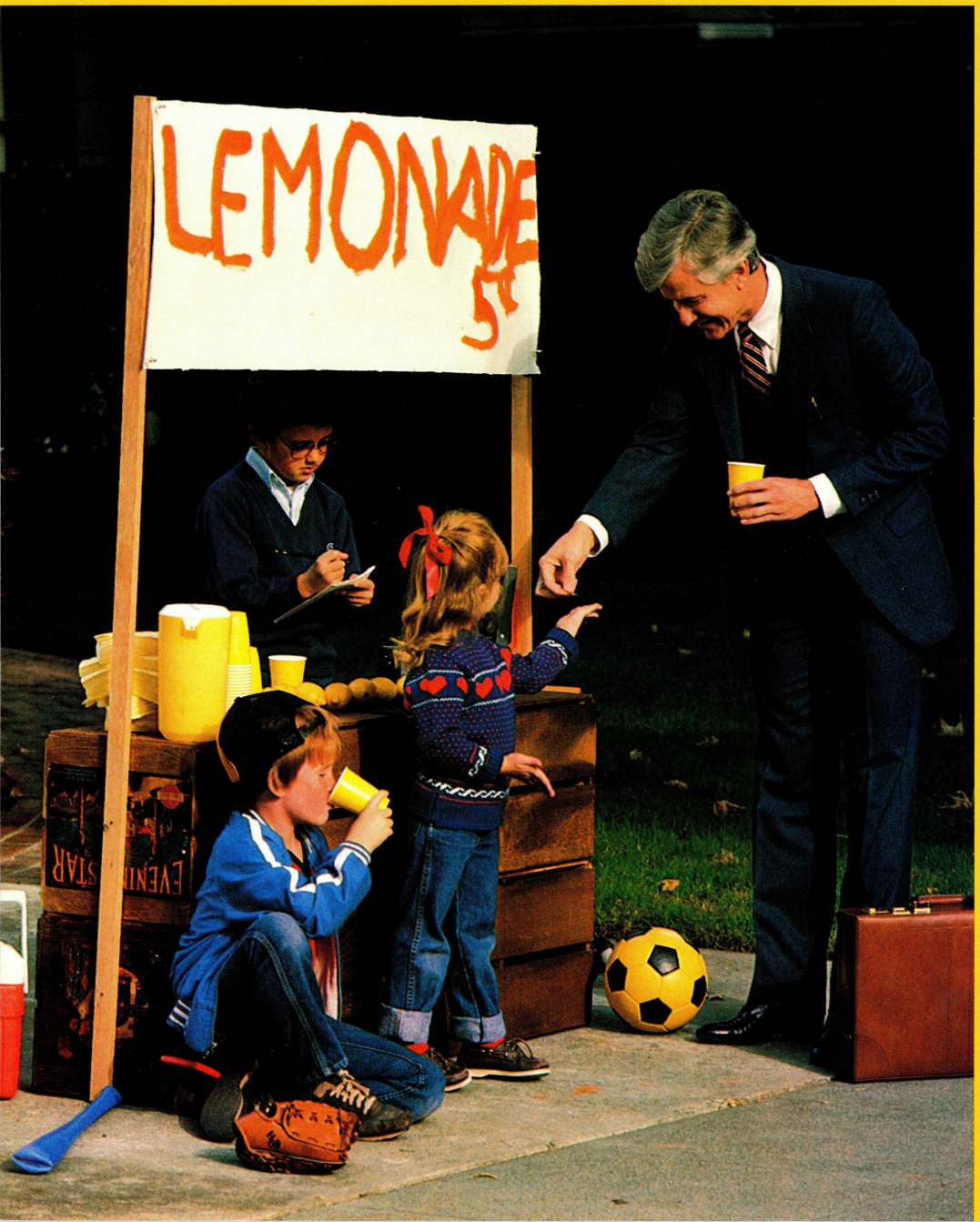
Here are the programs you'll find on *The Apple at Play:*

- **Apple 21:** Challenge the computer cardshark for big (but make-believe) bucks.
- **Financial Tools:** Figure loans, depreciation, and interest rates.
- **Lemonade:** Test your skill as the chief executive officer of a lemonade stand.
- **Music Recital:** Hum along with the Apple IIc.
- **Space Quarks:** Shoot 'em up in outer space.
- **Quick Quiz:** Test your mastery of the material in the guide. See what you know now, then come back later, and see how your score improves.

Look for Lemonade and other exciting educational games on *Apple Education Classics.*



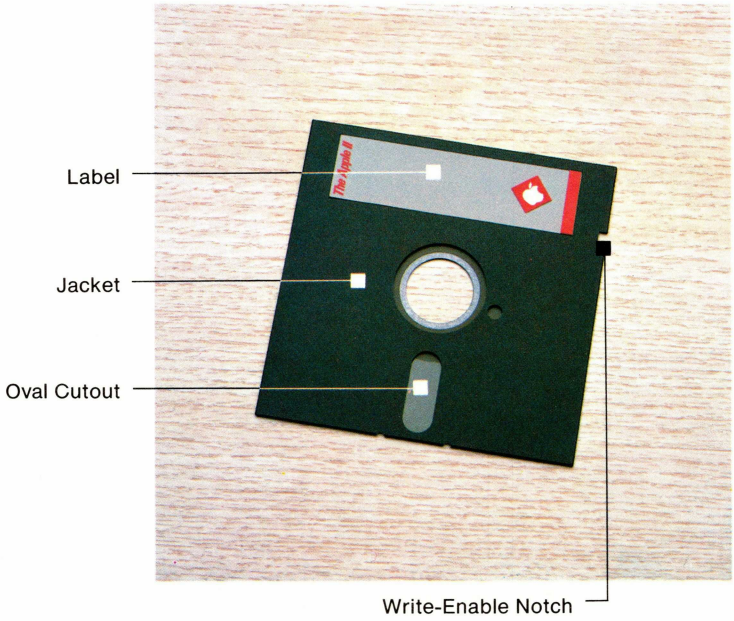
Welcome back. Hope you enjoyed the game disk.


LEMONADE
5¢

FYI: Disks

Figure 1-18 shows a 5¼-inch flexible (floppy) disk—the kind you use with your Apple IIc.

Figure 1-18. *A Flexible Disk*



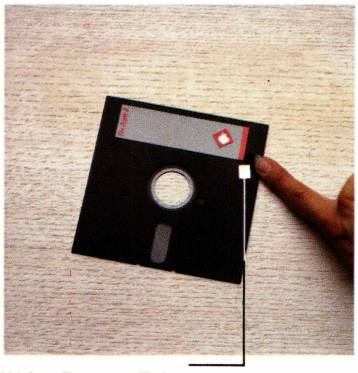
You can buy blank disks for storing your information. And you can buy disks containing programs—instructions that tell your computer what to do.

The disk itself is permanently sealed inside a black, plastic ***jacket*** *that protects the disk from fingerprints and dust. The disk is made of thin plastic and is covered with metallic oxide so that information can be recorded on it magnetically—the way sound is recorded on cassette tape.*

You can see part of the disk through the ***oval cutout*** *in the disk jacket. Don't touch the disk through the oval cutout or you defeat the purpose of the jacket! When the disk drive is in use, the disk spins inside its jacket, so all areas of the disk can be reached through the oval cutout.*

The notch on the upper-right corner of the disk is called the ***write-enable notch.*** *If that notch is covered, you can't write (save) things on the disk or otherwise change the contents of the disk, but you can read (load) things from the disk. If the notch is uncovered, you can write on it. Writing doesn't take place through the notch. The notch just indicates whether or not it's OK to write on the disk.*

Figure 1-19. *Cover the Notch With a Write-Protect Tab*



Many programs that you buy don't have a write-enable notch because the manufacturer doesn't want you to change the contents of the disk. When you don't want the contents of your disks changed (by mistake), you can cover the write-enable notch with a removable ***write-protect tab.*** *See Figure 1-19. (You'll find sheets of write-protect tabs packed with boxes of blank disks.)*

As you may have noticed, it is possible to record information on both sides of a disk, but it's not recommended (the disks must be certified for double-sided use).

Put single-sided disks in the disk drive with the label facing up. If the disk doesn't have a label, put it in the disk drive with the seams facing down.

Warning

Do not put a disk with a torn label or a torn write-protect tab in the disk drive—the disk can become impossible to remove.

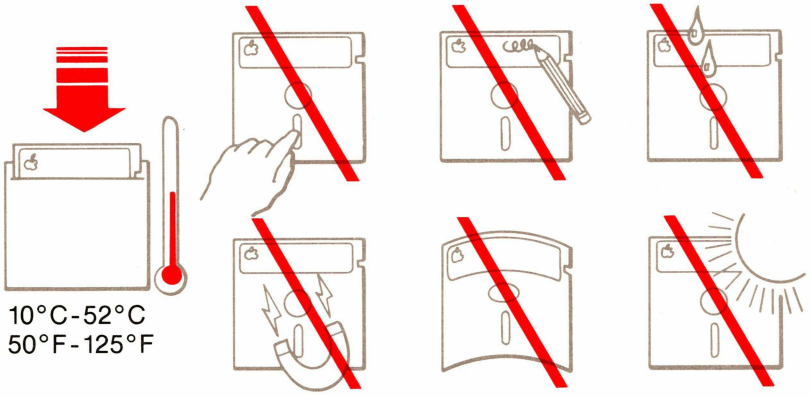
Disk Capacity

Each disk can hold approximately 143,000 characters. How that figure translates into pages of text or number of financial models you can fit on a disk depends on the program you're using. You might be able to fit 50 to 75 pages of a novel on a disk, but only one financial model.

Care of Disks

It's best to store your disks in their ***envelopes*** *in a disk holder. If you don't have a special disk holder, a shoe box works fine. Keep your disks away from direct sunlight (they warp), spilled milk (they drown), and things like telephones that contain magnets (they scramble). Write on disk labels with a felt-tip pen. Pencils and ball-point pens can damage disks. See Figure 1-20.*

Figure 1-20. *Do's and Don'ts of Disk Care*



When Is It OK to Take Out a Disk? *The simple answer to this question is that it's OK to take out a disk from the disk drive whenever the Disk Use light is off. But it's a little more involved than that.*

Technically it's OK to remove the disk as soon as the sound stops and the light goes off, but it's not a good habit to get into. Here's why. Some programs are only loaded into the computer one piece at a time. As other pieces are needed, the computer looks for those pieces on the disk. If you've removed the disk, those pieces can't be loaded and the program hangs (or dies).

Until you learn to distinguish between programs that load one piece at a time and those that load in one fell swoop, leave your program disk in the built-in drive until you're finished using the program or until you're ready to save your work on another disk. (If you have an external disk drive, the only time you have to remove your program disk from the built-in disk drive is when you switch programs or use both drives for copying.)

Chapter 1 Summary

Starting Up With the Power Off

1. Put a startup disk in the built-in disk drive (drive 1).
2. Turn on your monitor.
3. Turn on the Apple IIc.

Starting Up With the Power On

1. Put a startup disk in the built-in disk drive (drive 1).
2. Hold down [ó] and [CONTROL] while you press [RESET].

Special Keys

[RETURN]	Indicates that you've finished reading or typing something and that you're ready to proceed.
[ESC]	Gets you back to a previous menu or out of what you're doing.
[DELETE]	Erases characters to the left of the cursor.
[←] [→] [↑] [↓]	Move the cursor.
[CAPS LOCK]	Capitalizes all letters automatically.
[CONTROL] [ó] [ ]	Make other keys behave differently.

Special Switches

80/40 Column switch	Determines whether screen displays 40 or 80 characters across. Should be set to 40 (down) for a TV and 80 (up) for a monitor.
Keyboard switch	Switches to an alternate keyboard, called the Dvorak keyboard.

Chapter 2



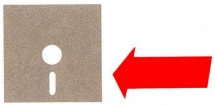
Putting the Apple IIc to Work

So far you've been using the computer to learn about the computer. You also can use the computer to write letters, prepare business reports, play games, prepare your income taxes, balance your checkbook, file your recipes, catalog your stamp collection, address your holiday cards, keep your bowling team scores, and learn to pilot a plane.

The magic that transforms your computer from a cockpit to a file cabinet is the program you feed into it. Programs designed for a particular purpose or application are called **application programs.** You can write them yourself (as you'll learn in Chapter 4) or you can use ready-made programs.

Hands On—The Apple at Work

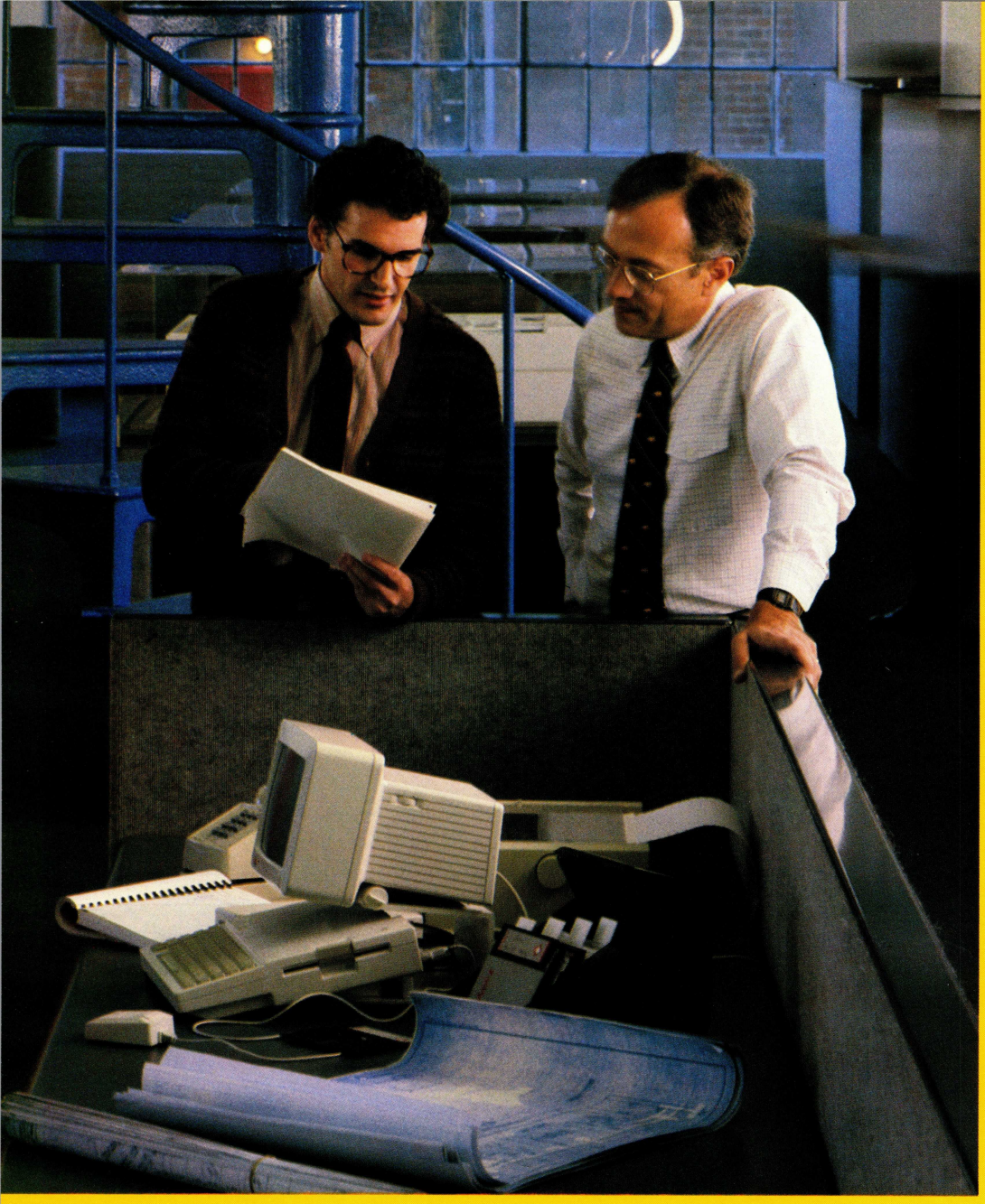
Notice that *The Apple at Work* disk has two sides—a 40-column side and an 80-column side. If you're using a television for a display device, the 40-column side of the disk should be facing up when you put the disk in the disk drive. If you're using a monitor, the 80-column side should be facing up.



Start up *The Apple at Work* for a demonstration of three popular types of application programs.

If you don't remember how to start up the computer, review the instructions in "Starting Up" and "Starting Up With the Power On" in Chapter 1.

Gibberish Fill Your Screen? Take *The Apple at Work* out of the disk drive and check the label. If your 80/40 Column switch is down, you should have the 40-column side of the disk facing up. If your 80/40 Column switch is up, you should have the 80-column side of the disk facing up. Put the disk back in the disk drive and restart the computer (press [apple] - [CONTROL] - [RESET].

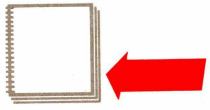


Keep in mind that this disk is only a simulation; that is, you can't use it to write letters, prepare budgets, or organize your files. Once you have completed *The Apple at Work,* you'll be equipped to go to your dealer and choose the application programs that fit your needs.

By the Way: This is a simulation of a program called AppleWorks. The actual program requires an 80-column display—you wouldn't be able to use it with a television set.

When you're finished with the disk, come back here for more on application programs.

Application Programs



Welcome back. *The Apple at Work* simulated three applications. Not all word processing, spreadsheet, and data base programs work the same way. Application programs vary tremendously in ease of use and in special features (bells and whistles) they offer. Decide which applications you want, and then ask your authorized Apple dealer to help you select one that meets your needs. Plan to spend several hours learning to use each application program—and several weeks mastering each one.

Popular Programs

Here are short descriptions of the most popular applications.

- **Word Processing:** For writing. Lets you write, erase, rearrange, and otherwise speed the writing process. Figure 2-1 shows a typical word processing display.

Figure 2-1. *Word Processing Display*

```
File: holiday                REVIEW/ADD/CHANGE                Escape: Main Menu
================================================================================
Dear Pat and Dick,

Sure is good to be writing you again. I can't believe it's been a year!

About the biggest news here is that we bought an Apple computer. In
fact, I'm using it right now to write you this letter. And you know if
butter fingers me can get it to work, it's got to be easy to use!

Nan and the kids are doing fine. Nan's been writing a lot of articles and
I'm still killing myself at the office. In my "spare" time I'm managing
Jimmy's ball team and let me tell you, those kids are GOOD.

How are your kids, by the way?  I'd really like to hear from you. Why not
buy a computer? It makes letter writing a breeze. Anyway, happy new
year and do keep in touch.

                                                Love,

                                                Harry and Nan

--------------------------------------------------------------------------------
Type entry or use OA commands    Line  3  Column  2       OA-? for Help
```

- **Data Base (or Data Management):** For keeping track of lists of information, such as names, addresses, phone numbers, birthdays, inventories, or collectible objects. They make it easy to recall, update, sort, and cross-reference information. Figure 2-2 shows a typical data base program display.

Figure 2-2. *Data Base Display*

```
File: CELEB                REVIEW/ADD/CHANGE                Escape: Main Menu

Selection:  All records

Pseudonym          Real Name                  Sign         Birth-year  Profession
================================================================================

Arden, Eve         Quedens, Eunice            Taurus       1912        actor
Arthur, Jean       Greene, Gladys             Libra        1908        actor
Astor, Mary        Langhanke, Lucille         Taurus       1906        actor
Barrymore, John    Blythe, John               Aquarius     1882        actor
Brice, Fanny       Borach, Fanny              Scorpio      1891        comedian
Burns, George      Birnbaum, Nathan           Aquarius     1896        comedian
Checker, Chubby    Evans, Ernest              Libra        1941        singer
Crawford, Joan     Le Sueur, Lucille          Aries        1908        actor
Douglas, Kirk      Demsky, Issur              Sagittarius  1916        actor
Dylan, Bob         Zimmerman, Robert          Gemini       1941        singer
Evans, Dale        Smith, Frances             Scorpio      1912        actor



--------------------------------------------------------------------------------
Type entry or use OA commands    Line  3  Column  2       OA-? for Help
```

- **Spreadsheet:** For producing financial statements, preparing budgets, estimating costs, and performing other number-crunching tasks you'd otherwise undertake with pencil, eraser, and calculator. Once you enter your information, you can try out different investments or pricing strategies without reentering the information. Figure 2-3 shows a typical spreadsheet display.

Figure 2-3. *Spreadsheet Display*

```
File: Wreckers.Budget        REVIEW/ADD/CHANGE                Escape: Main Menu
=======A======B======C======D======E======F======G======H======I=======J========
  1¦
  2¦                         BUDGET:  BIG BOY AUTO WRECKERS
  3¦
  4¦ INCOME
  5¦               Raffle, Net                                            800.00
  6¦               From Big Boy for uniforms      15.00      20           300.00
  7¦ ------------------------------------------------------------------------------
  8¦ TOTAL INCOME                                                        1100.00
  9¦
 10¦ EXPENSES
 11¦               Root Beer and Pizza                                    235.00
 12¦               Bats                            8.00      20           160.00
 13¦               Uniforms                       50.00      20          1000.00
 14¦ ------------------------------------------------------------------------------
 15¦ TOTAL EXPENSES                                                      1395.00
 16¦ ==============================================================================
 17¦ DONATIONS NEEDED                                                     295.00
 18¦


-------A------B------C------D------E------F------G------H------I-------J--------
```

- **Education:** For learning. Experience learning with a private and very patient tutor. Learn typing, Spanish, math, or anything else—at your own speed.
- **Home Finance:** For keeping track of income and expenses. Helps with budgeting, keeps track of deductible expenses for tax time, even helps balance your checkbook.

- **Communication:** For talking to other computers—big and small—by phone. With a communications program, such as Apple Access II, and a modem, you can tie into computerized information services for the latest stock prices or other information.
- **Games:** For fun. Shoot 'em up with enemy spacecraft or crawl through dungeons in quest of treasure.
- **Graphics:** For creating charts, graphs, or computer drawings.

Things You Can Do With Your Apple IIc

There are thousands of programs for the Apple II family of computers. Here's a list to give you an idea of some of the ways people use their computer. The list is grouped by application.

Communication

- Get the latest stock quotes.
- Read the headlines between newscasts.
- Thumb through the card catalog at your nearest computerized library.
- Send messages to Apples across town or country.

Data Base

- Catalog your home library (and call up books by title, author, or color of cover—you can tell a book by its cover).
- Keep an inventory of your valuables for insurance purposes.
- Keep track of your jogging times and distances.
- Catalog your Elvis Presley memorabilia.
- Pick a recipe by ingredient (mushrooms), by name (Coq au Vin), or by nationality (French).
- Catalog your business card collection.
- Keep statistics on your favorite baseball team or little league.
- Computerize your phone book (then get a listing of potential tennis partners).

Education

- Study for college entrance exams.
- Learn to pilot a plane.
- Learn to read music.
- Learn math or spelling with electronic flashcards.
- Learn touch typing.
- Learn Spanish or French.

Games

- Chase gum drops through a maze.
- Find your way out of a dungeon.
- Shoot 'em up with space villains.
- Gamble at blackjack or roulette without losing your shirt.
- Play golf on a rainy day.
- Play a game of chess.

Graphics

- Draw house plans or wiring schematics.
- Create charts and graphs for business presentations.
- Draw a self-portrait (and see how you'd look with a mustache or bangs).

Home Finance

- Manage your own stock portfolio; make sure your broker is giving you sound advice.
- Prepare your income taxes.
- Do your banking without leaving home.

Specialty Programs

- Plan your diet and count calories.
- Do your own horse handicapping and improve your odds at the track.
- Write music.
- Find out if it's a good day for romance (check your horoscope).
- Keep a watering and fertilizing schedule for your houseplants.

Spreadsheet

- Try out potential investments before you sink money into that kiwi farm in South Dakota.
- Find out if you can afford payments for a new car, yacht, swimming pool, or other extravagance.
- Do a cost estimate to see if it's feasible to add a second story to your house.
- Run a lemonade stand or other small business out of your garage.
- Prepare yourself to pay your income taxes by doing financial planning and budgeting year-round.

Word Processing

- Write a computer book (everyone else is).
- Create a perfect business letter (without bothering your secretary) then personalize it for everyone on the board.
- Write a term paper (then change the margins to make it look longer).
- Write your resume and customize it for different job openings.
- Write a novel (and change the name of the hero without a lot of retyping).

What Now?

The Apple at Work demonstrates what it's like to create and revise budgets, lists, and letters. Go to Chapter 3 to find out how the computer stores your budgets, lists, and letters while you're working on them and how you can save your work onto disks for permanent storage.

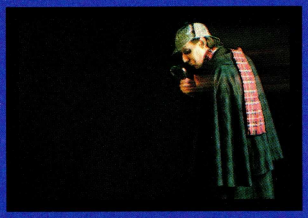
Chapter 2 Summary

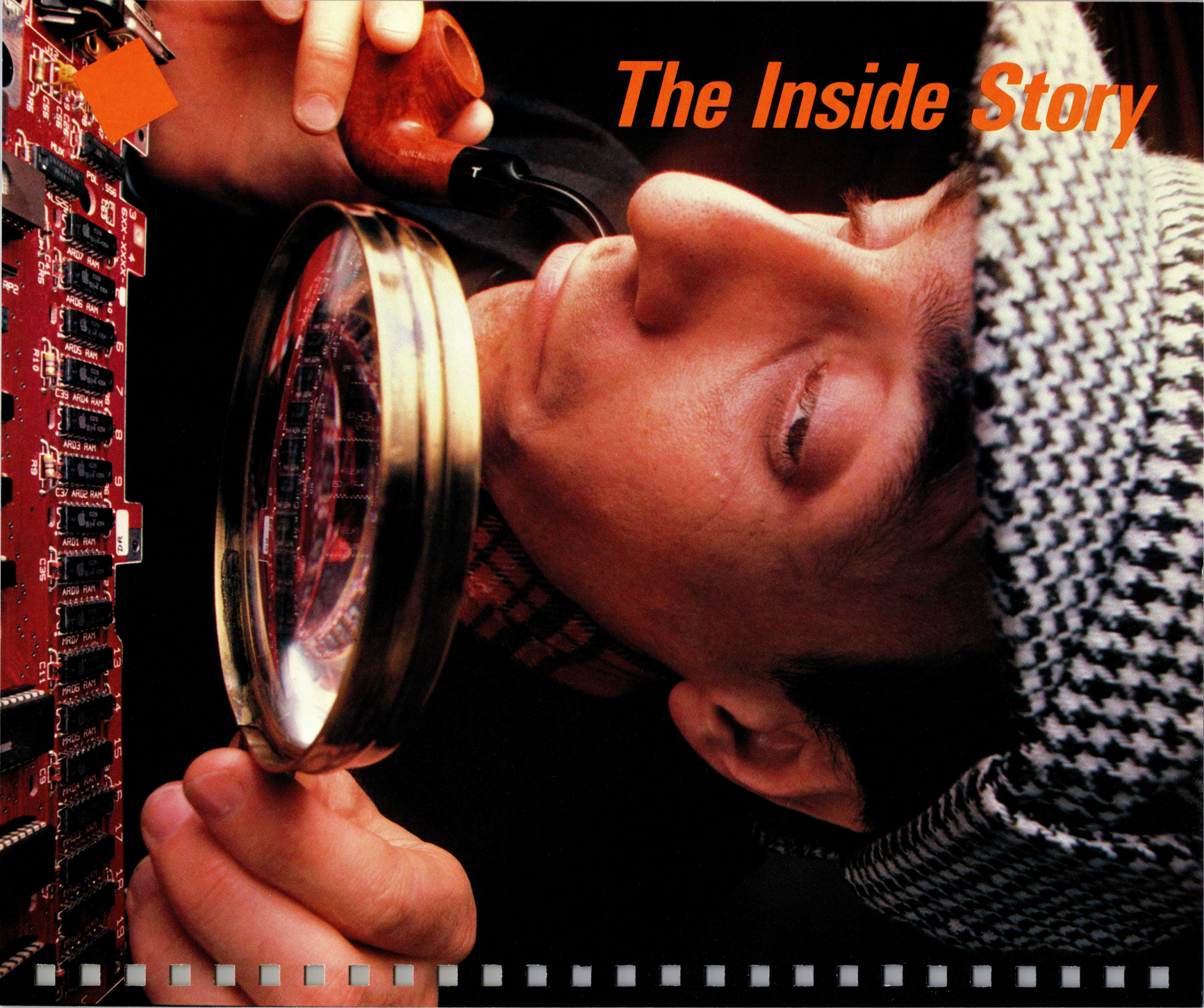
Application programs are programs designed for a particular purpose, such as budgeting, financial planning, or cataloging your butterfly collection.

Popular Applications

Word Processing	For generating letters, reports, and books.
Data Base	For keeping track of lists (addresses, inventories, collections)
Spreadsheet	For financial planning.
Education	For learning and expanding your horizon.
Graphics	For charts, graphs, and drawings.
Communication	For talking to other computers or computer services by phone.
Games	For fun.
Home Finance	For budgeting, portfolio management, and tax planning.

Chapter 3

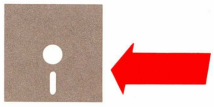



The Inside Story

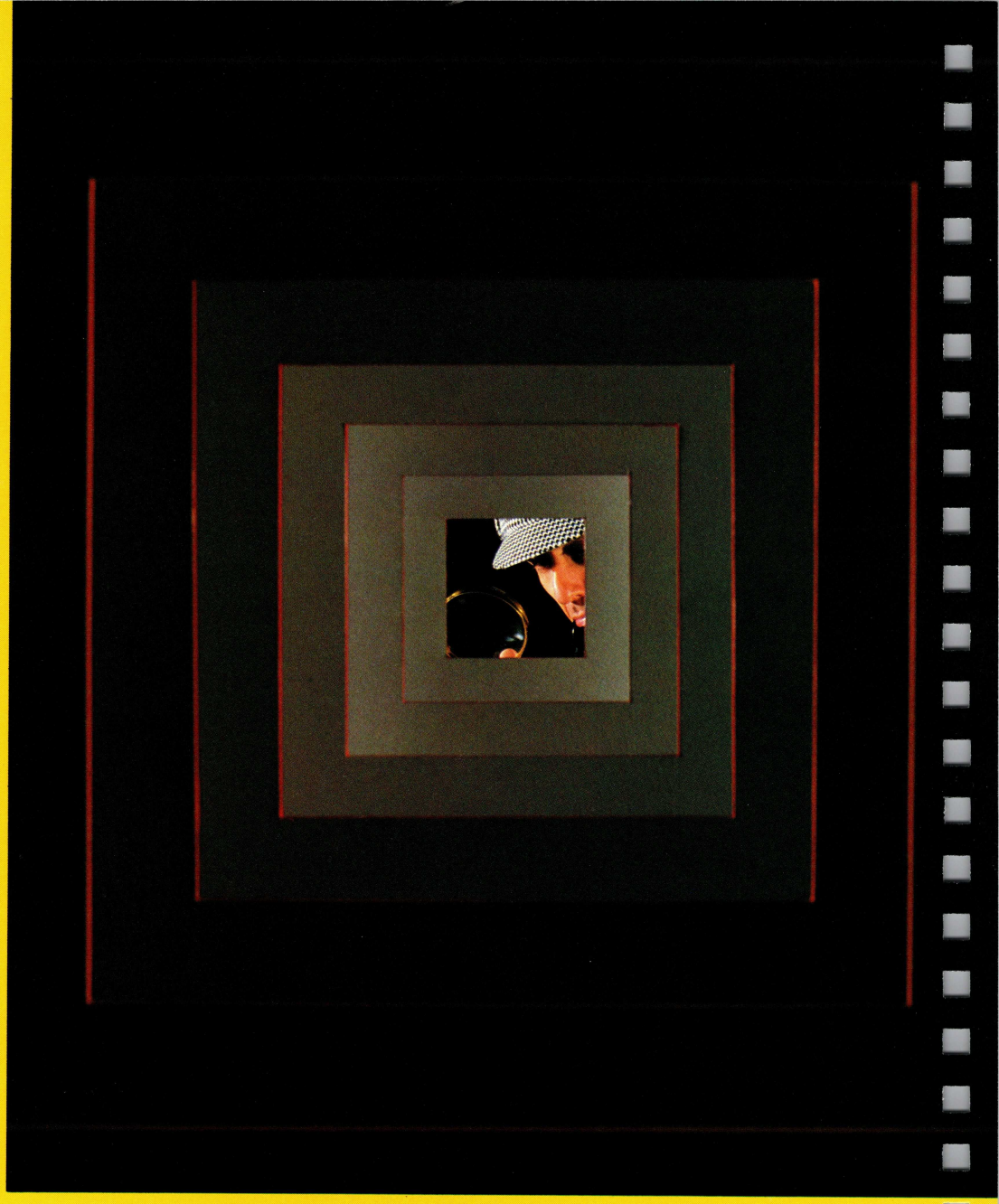
By now you've had some experience operating the computer. But what's going on behind the scenes? What makes the computer run? What really happens when you put a startup disk in the built-in drive and turn on the power?

Hands On—The Inside Story

The Inside Story is on the flip side of *Exploring Apple Logo.* Make sure *The Inside Story* label is facing up when you put the disk in the built-in disk drive.



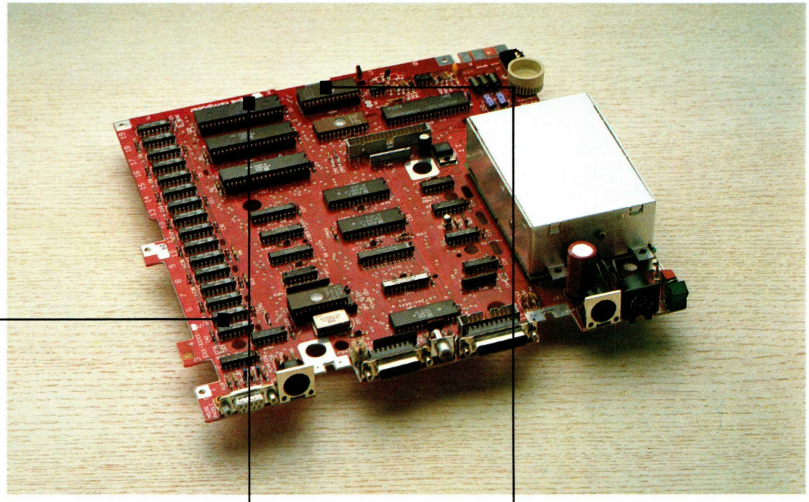
Understanding how the computer works will eliminate its mystery and allow you to be more productive and playful with the machine. Start up *The Inside Story* disk to find out what makes your computer tick.



Meet the Players

Welcome back. Now you know what's going on under the hood. Here's a closer look at the components that put the computer through its paces (Figure 3-1). If you don't care about the innards of the Apple IIc, skip to "How It Works."

Figure 3-1. *Main Logic Board*

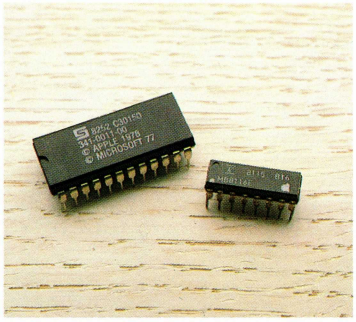


RAM (short for **random-access memory):** This is where programs and information are stored—the kind of information that changes from use to use and from user to user. Anything stored here is temporary. When you turn off the power, the information in RAM is erased.

Microprocessor: The brains behind the operation. The microprocessor carries out the instructions in the program.

ROM (short for **read-only memory):** Anything stored here is permanent and not changeable by the user! ROM contains, among other things, information the computer needs to get started. The programs in ROM are called **firmware** because they are more permanent than software.

Figure 3-2. *Close-Up of Chips*



RAM, ROM, and the microprocessor are **integrated circuits (ICs):** networks of microfine wires that conduct electrical impulses. The circuits are etched on silicon wafers, which reside on black, plastic chips that look like mechanical centipedes. See Figure 3-2.

The centipede legs are pins that connect the computer's memory (RAM and ROM) to the brain (the microprocessor) via electrical roads called **traces.**

Interface is a fancy word for go-between.

A **peripheral device** is an accessory.

In addition to the RAM, ROM, and the microprocessor, there are custom-made ICs that **interface,** or handle communication, between the microprocessor and **peripheral devices.** The Apple IIc has built-in interfaces for a second disk drive; a printer or plotter; a modem; and a mouse, joystick, or pair of hand controls.

How It Works

You don't need to know everything about how the computer works to successfully run programs. But you should have a feel for what it means to start up (or boot) the computer, create information, save information in a file on a disk, and retrieve information.

Starting Up

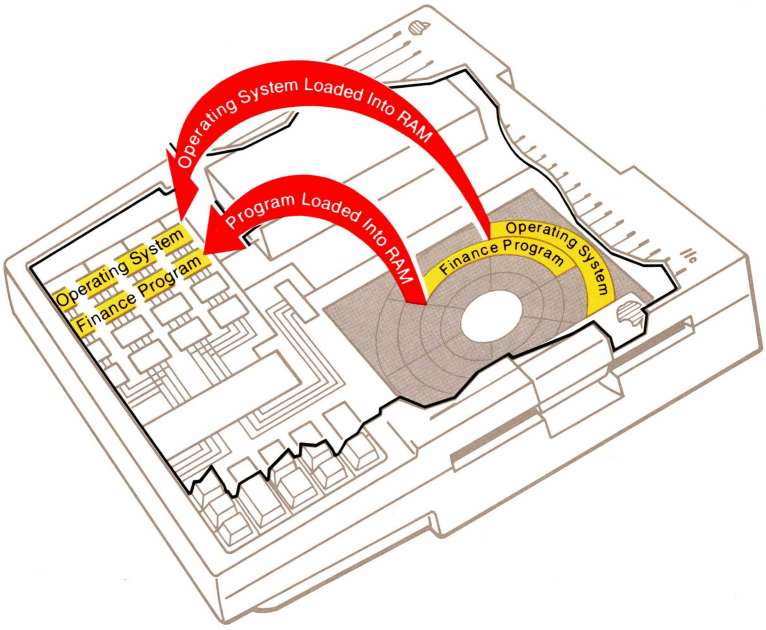
You've already had lots of practice with this one. It's what you do when you put a disk in the built-in disk drive and turn on the power. (Or when you hold down [Apple] and [CONTROL] while you press [RESET]. This method of starting the computer with the power already on is also called **restarting.**)

Every time you start your computer, a built-in program looks for a certain kind of disk in the built-in disk drive, drive 1. It's looking for a disk with an **operating system.** When it finds one, the operating system is put into **memory.**

Memory is a general term for RAM—the storage compartments inside your computer that hold programs and information you're working on. Computer memory capacity is measured in **K's,** short for **kilobyte.** (A kilobyte is to a thousand what a baker's dozen is to a dozen—1024 bytes to be exact.) One **byte** holds one character. The Apple IIc has 128K RAM, more than enough for most popular business and entertainment programs.

The operating system is a combination traffic cop and housekeeper. It controls the way your program is loaded into memory, the way the computer works with information, the way your information will be stored on a disk, and the way the computer talks to your printer and other peripheral devices. Once the operating system is in memory, the application program is put into another part of memory, and your computer takes on its personality as a number cruncher or space invader. See Figure 3-3.

Figure 3-3. *Starting Up. Once the operating system is in memory, it loads the application program.*

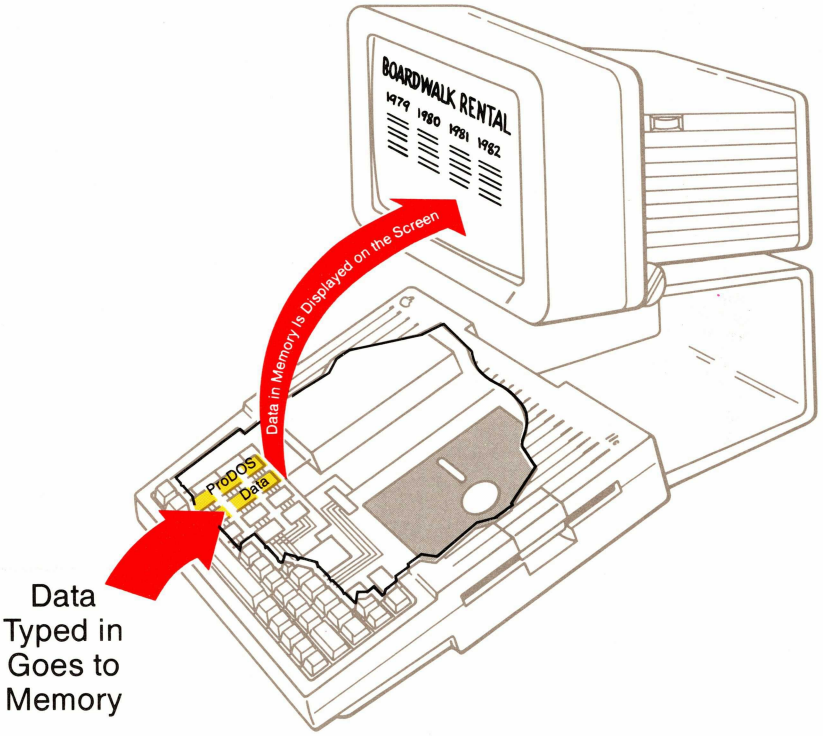


Creating Information

When your application program is in memory, you can start using it to figure out investment strategies, to compose sonnets, or to design sports cars—depending on what kind of program is in memory.

The numbers, words, and other raw information you feed into the computer is called **data.** As you type information, it is sent to yet another part of memory and displayed on the screen where you can see it. Figure 3-4 illustrates how the operating system, the application program, and your data share memory.

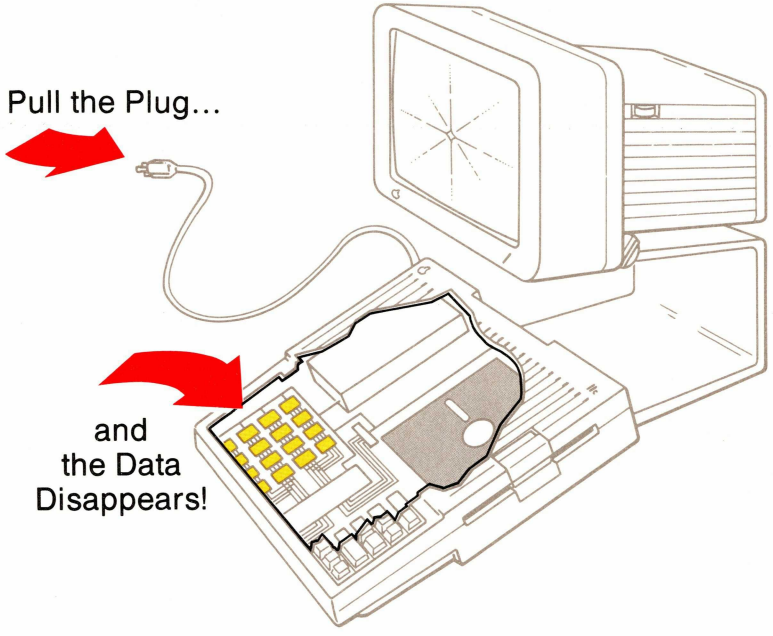
Figure 3-4. *Your Information Is Kept in Memory, Too*



It's important for you to realize that what you see on the screen is only temporarily stored in the memory of the computer. It's not like a typewriter where what you type appears on a page in a more or less permanent form.

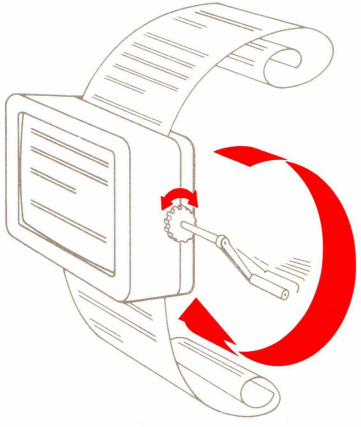
If you turn off your computer, switch to another program, or trip over the power cord, your data is gone forever. See Figure 3-5. That's why it's important to save a copy of your work on a disk. And it's a good idea to save your work every ten minutes or after any particularly inspired entry.

Figure 3-5. *Memory Is Temporary*



Scrolling: There's a lot more room in memory than there is room on the screen to display it. You can use the arrow keys in most programs to see other information in memory. Just move the cursor to an edge of the screen using one of the arrow keys. Press the arrow key again, and a new line or column will come into view. This is called **scrolling** and is illustrated in Figure 3-6.

Figure 3-6. *Scrolling*



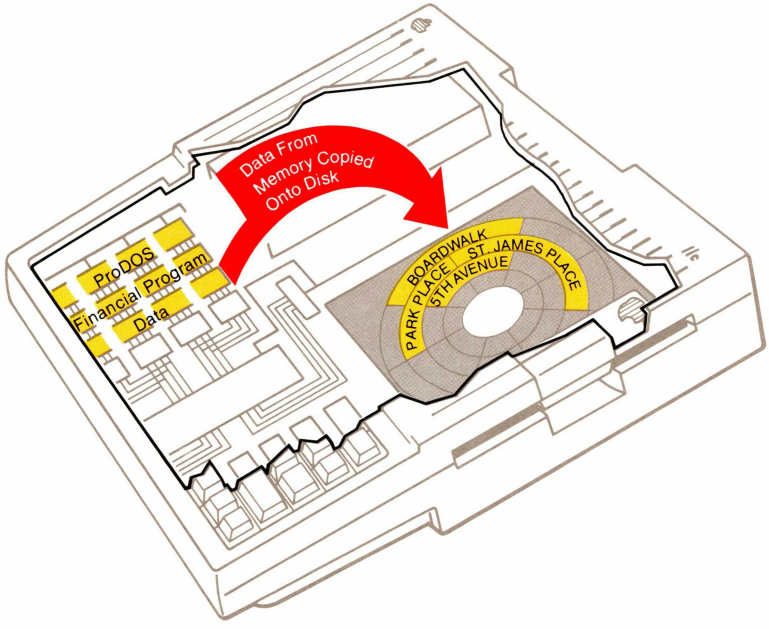
Saving Information on a Disk

A **file** is a collection of information. It can be a poem, a profit/loss statement, a phone list, and so on.

When you save the information in memory onto a disk, you put it in a **file.** Think of your disk as a file cabinet; think of each file as a folder where you keep your information. How you save information in a file on a disk varies from program to program.

The computer doesn't transfer what's in memory to the disk, it only sends a copy. Your information stays in memory until you turn off the computer or start working with different data. See Figure 3-7.

Figure 3-7. *Saving Information in a File on a Disk*



Information on a disk is more permanent than information in the memory of the computer. But even information on a disk is vulnerable. That's why it's a good idea to keep at least two copies of all your data disks. This practice is called **backing up.** Most application programs will tell you how to make backup copies.

Formatting Disks: Before you can save your work on a blank disk you have to format the disk. Formatting a disk means dividing the magnetic surface of the disk into sections (called **sectors**) where information can be stored. The reason disks don't come preformatted is that different computers require different formats. (You only need to format a disk once. If you format the disk again, everything on the disk is erased.) You'll learn everything you need to know about formatting in the utilities booklet for the Apple IIc.

Filenames

When you save a file on a disk, you give that file a name. You can name your files anything you want as long as you observe these general filename rules:

- Maximum of 15 characters long.
- Numbers, letters, periods (no other punctuation) permitted.
- Must begin with a letter.
- No spaces permitted.

Some programs have slightly different rules, but if you follow these, you can't go wrong.

Retrieving Information From a Disk

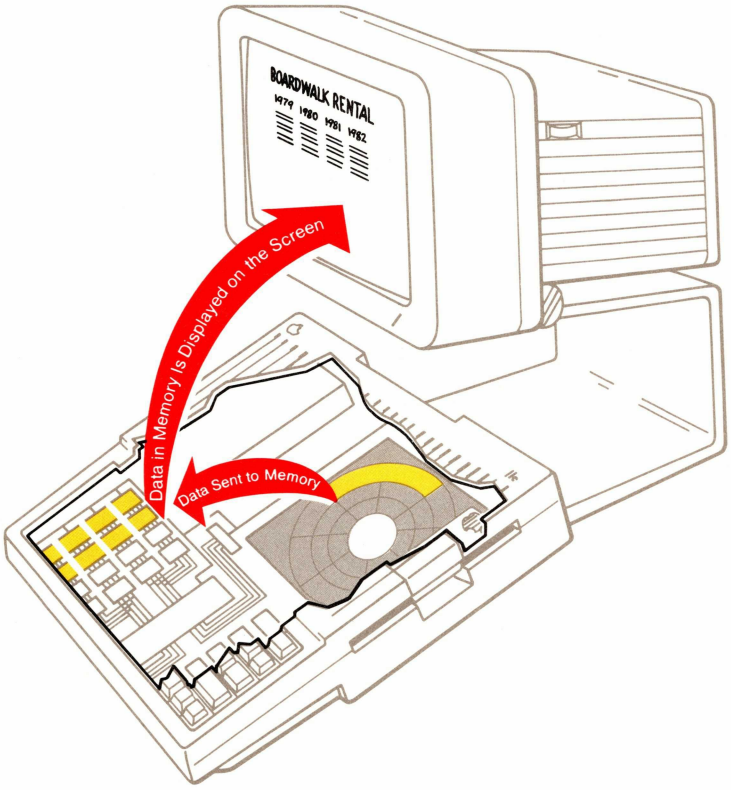
To retrieve information you've saved on a disk, you start up the computer with the program you used to create the data, you ask for the file by name, and a copy of the file is loaded into the memory of the computer. (Again, how you retrieve information from a disk varies from program to program.) See Figure 3-8.

Once the information is loaded into the computer's memory, you can print it (if you have a printer hooked up to your computer), you can revise it, and you can save the new version in a file on your **data disk.**

A **data disk** is a disk you use to store information.

The fact that you're only loading a copy of the file into memory, frees you to rewrite and rearrange the information. If you don't like the results of your experiments, your original is still intact on the disk.

Figure 3-8. *Loading the Contents of a File Into Memory*

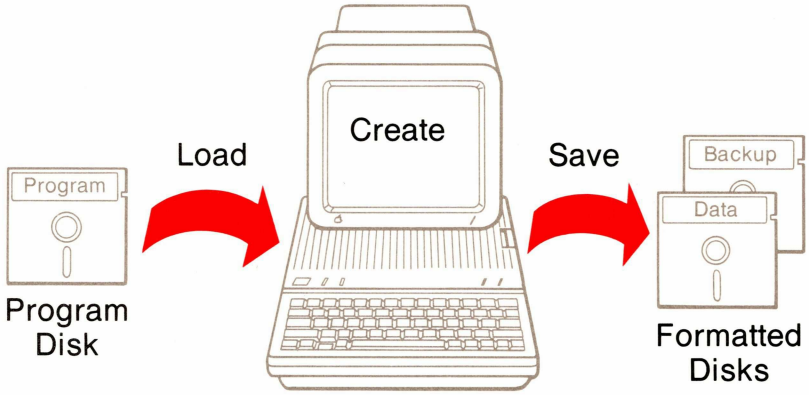


Once you finish working with a file, you can save it with the same name you used before or you can give it a new name. If you save the revised information with the original filename, you write over (and lose) the original data. If you save the revised information with a new filename, both the original and the revised version are preserved on the disk. Each file on a disk must have its own unique name.

Putting It All Together

Figure 3-9 illustrates the process of using an application program: starting up, creating information or data, saving the information in a file on a disk, and backing up that information.

Figure 3-9. *Using an Application Program*



Programs and Data Don't Mix: It's possible to combine programs and data on the same disk, but it's not a very good idea. For one thing, application programs can take up a lot of space on the disk, and while you might be able to squeeze one or two letters on your word processing program disk, you couldn't make a habit of it.

For another thing, many startup disks don't let you save data on them. They're **write protected,** which means you can't add anything to or change anything on the disk. Finally, startup disks are expensive. Application programs can cost hundreds of dollars. You don't want to risk erasing or copying over one by mistake.

FYI: Operating Systems

Most of the time you can ignore the operating system. It does its work behind the scenes. The only time you have to be concerned about the operating system is when you're formatting new disks and when you're saving information on disks.

*There are three operating systems available for the Apple IIc (**ProDOS, DOS 3.3,** and **Pascal**), and each operating system saves information on disks in a different way.*

ProDOS™ is short for **Professional Disk Operating System.**

DOS 3.3 rhymes with "boss" and is short for **Disk Operating System.**

Pascal is a combination operating system and computer language.

If your word processing program uses the ProDOS operating system, you have to save your data on ProDOS-formatted data disks. If your data base program uses the Pascal operating system, you have to save your data on Pascal-formatted data disks. You can't keep your word processing and data base data on the same disks unless the two programs use the same operating system.

Most people use only one or two programs for the bulk of their work, so it's not difficult to keep your data disks straight. One solution is to keep separate disk holders for data created with different programs. See Figure 3-10.

Another solution is to label your data disks with the name of the program or operating system. See Figure 3-11.

Figure 3-10. *Separate Disk Holders for Different Programs*

Figure 3-11. *Label Data Disks With the Operating System*

Early DOS: *The Apple IIc does not support DOS 3.2 or other operating systems designed for very early versions of the Apple II. But you can update most programs and files created with those operating systems to DOS 3.3 by using a program on the utilities disk for the Apple IIc.*

Chapter 3 Summary

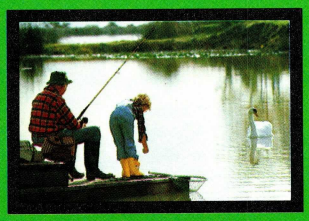
Main Parts of the Computer

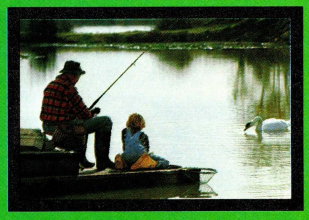
Microprocessor	Does the computing. Carries out the instructions in computer programs.
RAM	Short for **random-access memory.** This is where programs and data are stored temporarily. Whatever is in RAM goes away when power goes off.
ROM	Short for **read-only memory.** Permanent memory. Contains, among other things, information the computer needs to get started.

Four Steps to Using a Computer

1. Starting up. Put a startup disk in drive 1, the built-in drive, and turn on the power.
2. Creating information. Use the keyboard to create letters, budgets, charts.
3. Saving information. Give what you've created a name and store it in a file on a disk for permanent storage.
4. Retrieving information. Load information from a file back into memory where you can change the contents of the file or send the contents of the file out to a printer to produce a paper copy.

Chapter 4






Programming

Writing a computer program involves taking a task, breaking it down into small steps that the computer can perform, and expressing those steps in terms the computer can understand. There's a program for almost every application under the sun, so you don't have to learn how to program. But a lot of people learn for the fun and the challenge of it.

Why Program?

There are lots of good reasons for learning to program:

- It's an exercise in logic.
- It lets you write programs specific to your needs.
- It lets you control the operation of the computer.
- It gives you something to talk about with your child who is learning how to program in school.
- It helps justify the time you spend in front of your TV.
- It gives you a chance to write a best-selling program.
- It's easier to understand the programs you buy.

But don't learn to program because you think you have to.

Why Not Program?

There also are good reasons for *not* learning to program:

- You can use the computer successfully without knowing anything about programming, just as you can successfully drive your car without knowing how the engine works.
- Writing programs takes time—lots of it—and you might have other ways you'd rather spend yours.

Learning to Program

If you'd like to find out what programming is all about, you've come to the right place. There are two disks in the guide designed to give you a feel for programming: *Exploring Apple Logo* and *Getting Down to BASIC.*

Don't Be Shy: Sampling these disks doesn't commit you to a life of programming. Even if you decide to leave programming to others, the skills you will learn—putting small pieces together to form a large structure and breaking large problems down into manageable steps—are valuable skills whether you program or not.

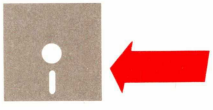
Just as there are different human languages, there are different computer languages. Logo and BASIC are two computer languages especially suited to new programmers.

Logo

Logo is rapidly becoming a standard in the schools, because it's easy and fun to learn (with lots of emphasis on graphics), yet powerful enough for serious programming. In addition to building computer skills and confidence, Logo builds communication skills, as children and adults bounce programming ideas off each other.

Hands On—Exploring Apple Logo

Exploring Apple Logo is on the flip side of *The Inside Story.* Make sure the *Exploring Apple Logo* label is facing up when you put it in the built-in disk drive.



Start up *Exploring Apple Logo.* Mark your place so you know to come back here when you're finished.

If you don't remember how to start up, review the instructions in "Starting Up" and "Starting Up With the Power On" in Chapter 1.

Logo Revisited

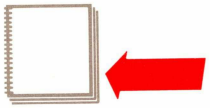
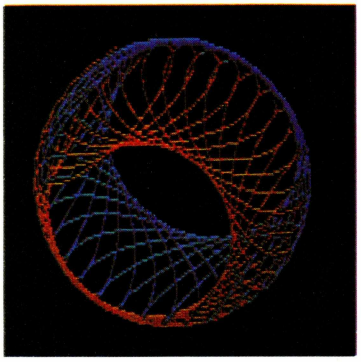


Figure 4-1. Logo Art



Welcome back. Exploring Apple Logo teaches you some important programming concepts. It shows you how you can combine simple steps into increasingly complex procedures, and it shows you how you can break complex procedures down into simple steps. Because Logo is easy to learn and provides immediate results, it encourages experimentation—learning through discovery. You can see why Apple Logo is popular with teachers, and with parents who want to learn about computers along with their children.

You can write Apple Logo programs for fun or for serious applications—like the compound interest program you saw on *Exploring Apple Logo.* One of the most popular and dramatic uses for Logo is generating computer art. Figure 4-1 shows you the kinds of graphics you can create with Apple Logo.

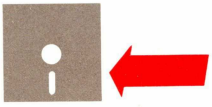
If you'd like to have Apple Logo for yourself or your family, ask your Apple dealer for the Apple Logo package. This package includes the Logo language disk, a reference manual, a clear and easy to follow Logo tutorial, and a training disk that introduces more Logo features.

BASIC

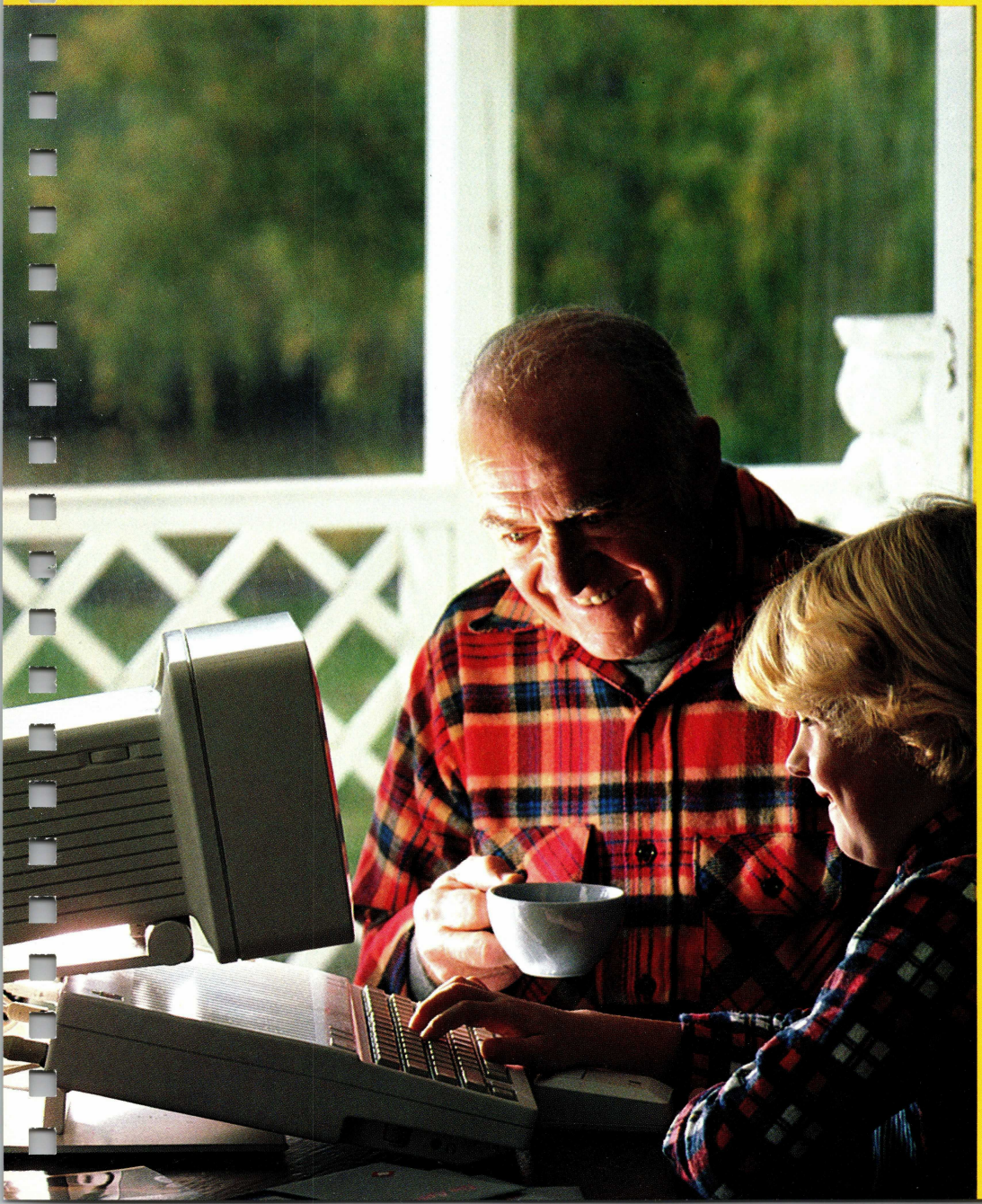
BASIC (short for **Beginners All-purpose Symbolic Instruction Code**) is also easy to learn. BASIC allows you to write instructions for the computer in English-like words and phrases. It has the additional advantage of being built into your computer (so it's free).

BASIC was the first language built into personal computers, so you'll find that a lot of your computer friends speak the same language. There are several different dialects of BASIC. The Apple IIc dialect is called **Applesoft BASIC.**

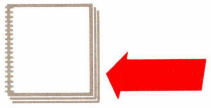
Hands On—Getting Down to BASIC



Start up *Getting Down to BASIC,* and come back here when you're finished. If you don't remember how to start up, review the instructions in "Starting Up" and "Starting Up With the Power On" in Chapter 1.



Getting Down to BASIC



Welcome back. *Getting Down to BASIC* introduced you to a lot of programming concepts. This section summarizes the disk and introduces you to some more Applesoft BASIC. Remember, though, that only a small portion of Applesoft BASIC is covered here. For a description of Applesoft in all its glory, ask your dealer for the *Applesoft Tutorial* and the *Applesoft Reference Manual.*

Printing Numbers and Doing Calculations

Applesoft's PRINT statement lets you print information on the screen. One function of the PRINT statement is to print numbers. To print the number *5,* you'd type `PRINT 5` and press RETURN.

Don't forget that you must press RETURN after every Applesoft statement.

You can use your computer as a calculator to add, subtract, multiply, and divide using these symbols:

Addition	+
Subtraction	–
Multiplication	*
Division	/

To multiply 44 by 55, you'd type `PRINT 44 * 55`.

Moving On

Your computer can do calculations that require more than one operation. Here's the order in which Applesoft performs such calculations:

This order is known as **precedence.**

Parentheses (innermost first)	( )
Multiplication and Division	* /
Addition and Subtraction	+ −

Calculations of the same type (two additions) or of the same priority (for example, addition and subtraction) are performed from left to right.

See if you get the same answers:

9 + 4 * 3 = 21

Hint: The computer does multiplication before it does addition.

(9 + 4) * 3 = 39

Hint: The computer always does what's in parentheses first.

4 - 16 / 4 = 0

Hint: The computer does division before subtraction.

(2 + 3) + (4 * 3) + 6 / (1 + 1) / 3 = 18

Hint: The computer does what's in parentheses first. Then, by priority, the computer performs calculations of the same type from left to right. Division is done before addition.

When in doubt, put parentheses around the operation you want done first.

Computer as Calculator: You can use your computer as a calculator any time you're in Applesoft BASIC. There are several ways to get into Applesoft BASIC. But if all you want to do is use your computer for some calculations, it's quicker to start up your computer without a disk in the built-in disk drive. Take the disk out of the disk drive and hold down CONTROL while you press RESET. (This puts you into Applesoft BASIC, but does not load the ProDOS operating system—you'll be able to write programs and do calculations, but you won't be able to save them on a disk.)

Remember, you can press ← and → to correct typing mistakes.

Printing Words

When you want the computer to display a word or any set of characters, type what you want to see inside quotation marks. To print the words *JIGSAW PUZZLE*, you'd type

```
PRINT "JIGSAW PUZZLE"
```

To print the equation *3 + 4*, you'd type

```
PRINT "3 + 4"
```

If you wanted to know the sum of 3 + 4, you'd type

```
PRINT 3 + 4
```

without the quotation marks.

Moving On

A Typing Timesaver: In Applesoft BASIC, you can use a question mark (?) in place of PRINT. For example, if you type `PRINT 4 + 4` or `?4 + 4`, the Apple displays 8.

Formatting Print Statements: If you use a semicolon between parts of a PRINT statement, the parts are printed next to each other without any extra spaces. For example, if you type `PRINT "2+3=";2+3`, the computer displays 2+3=5.

Notice that the semicolon goes outside the quotation marks.

Writing Programs

A computer program is a set of instructions that tells the computer what to do. You can write Applesoft BASIC programs that use either deferred execution or immediate execution. In **immediate execution,** each statement is executed immediately after you press RETURN.

In **deferred execution,** each statement you type is put into the computer's memory and stored until you type RUN to execute the program. To write a statement in deferred execution, you must begin the statement with a line number.

`10 PRINT "HI THERE"` is an example of a deferred execution statement.

Every program should end with an END statement. The END statement tells the computer that the program is finished.

To see the lines of your program on your screen, type `LIST`.

Here's a summary of how to add, delete, insert, and correct lines in your program:

- To add a line to a program, type a new line number, followed by the statement, and then press (RETURN).
- To delete a line from a program, type the line number of the line you want to delete and press (RETURN).
- To insert a line in a program, type a line number that's between two existing line numbers, followed by the statement, and then press (RETURN).
- To correct a line in a program, retype the line number and then type your revised statement.

Moving On

Adding Blank Lines: To add a blank line to a program, simply type a line number, followed by `PRINT`, and then press (RETURN).

If you type this program,

```
10 PRINT "FEE FI"
20 PRINT
30 PRINT "FO FUM"
40 END
```

your screen will show

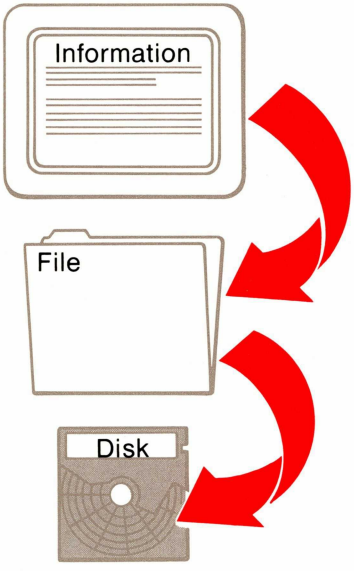
```
FEE FI

FO FUM
```

Loading and Saving Programs

Every time you write a program, it's stored in the computer's memory. When you turn off the computer, the program disappears. To permanently save a program, you need to store the program in a **file** on a disk. (See Figure 4-2.)

A **file** is a collection of information that you store on a disk.

Figure 4-2. *Files on a Disk*



Information Is Stored in a File on a Disk

Before you can store a program, you must give it a filename. Every filename must follow the rules set out by ProDOS, the operating system used by Applesoft BASIC. According to these rules, every filename must

- begin with a letter
- be 15 characters or less.

A filename cannot

- contain any spaces
- contain any characters other than letters, numbers, or periods.

To save a program in a file on a disk, type SAVE and then the name of the program (for example, SAVE PUZZLE). To save a program on a disk in the external drive, type SAVE, then the name of the program, then a comma, then D2 (for example, SAVE PUZZLE,D2).

To run a program that's stored on a disk, you first load the program from the disk into the computer's memory. To do this, type LOAD and then the name of the program (for example, LOAD PUZZLE). To load a program from a disk in the external drive, type LOAD, then the name of the program, then a comma, then D2 (for example, LOAD PUZZLE,D2). Then type RUN to run the program in memory.

To clear out or erase what's in the computer's memory, type NEW. It's a good idea to type NEW before you begin typing a new program to get rid of leftovers in memory.

ProDOS Commands: You may have noticed that commands that deal with the disk or the disk drive (such as CAT, LOAD, and SAVE) are never preceded by line numbers. That's because each of these commands is a ProDOS command, which is executed immediately after you type it.

Moving On

A Short Cut: Up to this point, you've used the LOAD command to load a program into the computer's memory and the RUN command to run the program you've loaded. You can save some keystrokes by typing RUN and then the name of the program that's stored on the disk. When you do this, the program is loaded into memory and then executed, all in one step.

The HOME Command: If you want to get rid of what's on your screen, type HOME and press (RETURN). The HOME command clears the screen, but not memory.

Variables and INPUT Statements

A variable is a name for a place inside your computer where information is temporarily stored.

There are two kinds of variables:

- Numeric variables (for storing numbers).
- String variables (for storing groups of characters, like names).

Every variable must have a name. Here are Applesoft's rules for naming variables:

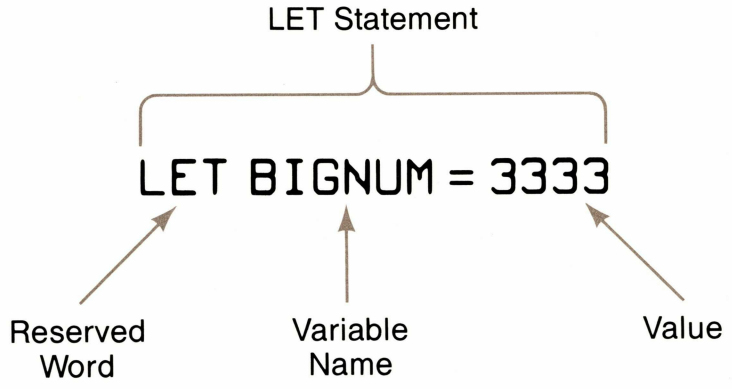
- Every variable name must begin with a letter.
- A string variable name must end with a dollar sign ($).
- Applesoft only uses the first two characters of a variable name to distinguish one variable from another. So, to Applesoft, TEST1 and TEST2 are the same variable. But it's a good idea to use whole words for variables because they're easier to remember than a pair of letters, just make sure the first two characters are unique.
- An Applesoft **reserved word** cannot be a variable name or part of a variable name. If, for example, you try to create a variable named FLAVOR, you will get the message SYNTAX ERROR because the reserved word *or* is included in that variable name. See the list of Applesoft BASIC reserved words in Appendix E.

An Applesoft BASIC **reserved word** is a word like *print* or *run* that the computer interprets in a special way. Appendix E lists all of the reserved words.

The LET Statement

The LET statement lets you assign a value to a variable from within a program. `LET BIGNUM = 33333` creates a variable named BIGNUM and assigns the value 33333 to that variable. The *LET* in a LET statement is optional. So, to Applesoft, `LET BIGNUM = 33333` and `BIGNUM = 33333` mean the same thing. Figure 4-3 illustrates the anatomy of a LET statement.

Figure 4-3. *Anatomy of a Statement*



The INPUT Statement

The INPUT statement lets you assign a value to a variable from the keyboard. An input statement is usually preceded by a PRINT statement that asks a question. Each time the computer sees an INPUT statement, it

- puts a question mark on the screen
- creates a variable with the name given in the INPUT statement
- assigns whatever number or word you type to the variable.

It's Your Turn

This section presents two sample programs along with complete explanations of how they work. If you want to try these programs, start up *Getting Down to BASIC.* When the menu is displayed, select the Quit option. You'll immediately see the Applesoft prompt—]—the signal that you can go ahead and start writing your program.

You Need to Load the Operating System: The reason you have to start up *Getting Down to BASIC* before you can write your program is that while Applesoft BASIC is built into your computer, the operating system (ProDOS) is not. (You'd be able to write your program, but you wouldn't be able to save it in a file on a disk.) Starting up *Getting Down to BASIC* loads the operating system into the computer. Review Chapter 3 if you're a little hazy about what operating systems do.

Converting Miles to Kilometers

Here's an Applesoft program that converts miles to kilometers.

Program Line	Explanation
`10 PRINT "THIS PROGRAM CONVERTS"` `20 PRINT "MILES TO KILOMETERS."`	Describes what the program does.
`30 PRINT "HOW MANY MILES"` `40 PRINT "DID YOU TRAVEL";`	Prints your request for information. The semicolon instructs the computer to leave the cursor on the current line rather than move it to the next line.
`50 INPUT MILE`	Puts ? on the screen. Whatever number you type is stored in a variable named MILE. Note that because of the semicolon in line 40, the question mark appears on the same line as the question.
`60 LET KILO = MILE/.62137`	Creates a variable named KILO, which is equal to MILE (the number you enter) divided by .62137.
`70 PRINT "YOU TRAVELED ";KILO;` `80 PRINT " KILOMETERS."`	Prints what's inside the first set of quotation marks, then prints the value of KILO, then prints what's inside the quotation marks in line 80.
`90 END`	Signals the end of the program.

Once you've typed the program, you can try it by typing

```
RUN
```

Here's what you'll see:

```
THIS PROGRAM CONVERTS
MILES TO KILOMETERS.
HOW MANY MILES
DID YOU TRAVEL?3
YOU TRAVELED 4.82804127 KILOMETERS.
```

Spacing? If the spacing on your screen isn't exactly correct, you may have forgotten to type a space inside one of the PRINT statements. To retype a line, type the line number of the line you want to correct, then type the new statement.

You can save this program on the *Getting Down to BASIC* disk by typing SAVE followed by a name, like KILO. Then, when you want to load the program, simply type LOAD KILO.

Write Your Own Conversion Program: You can use PRINT and INPUT statements (and this program as a guide) to write programs to convert any measure you can think of. Try Celsius to Fahrenheit or inches to millimeters.

Crazy Sentences

This program uses INPUT statements to create a crazy sentence. Each time you run the program, the sentence the program creates will be different (unless you type the same responses).

Don't Forget to Clear Memory: Before you try another program, don't forget to clear memory by typing NEW.

Program Line	Explanation
`10 PRINT "COLOR";`	Prints a request for a color. The semicolon tells the computer not to go on to the next line.
`20 INPUT C1$`	Displays ? on the screen. Whatever color you type is stored in the variable C1$ (pronounced "see-one-dollar"). The word *color* cannot be used as a variable name because it's an Applesoft BASIC reserved word.
`30 PRINT "ANOTHER COLOR";`	Prints a request for a second color.
`40 INPUT C2$`	Displays ? on the screen. Whatever color you type is stored in the variable C2$.
`50 PRINT "NAME";`	Prints a request for a name.
`60 INPUT N1$`	Displays ? on the screen. Whatever name you type is stored in the variable N1$.
`70 PRINT "ANOTHER NAME";`	Prints a request for a second name.
`80 INPUT N2$`	Displays ? on the screen. Whatever name you type is stored in the variable N2$.
`90 PRINT`	Prints a blank line.

`100 PRINT "THE ";C1$;" ROBOT"`
`110 PRINT "WITH THE ";C2$;" EYES"`
`120 PRINT "GRABBED ";N1$;" WHILE"`
`130 PRINT N2$;" RAN FOR HELP."`
	Prints what's inside the quotation marks interspersed with the colors and names you assigned to the variables.

`140 END`	Signals the end of the program.

After you type RUN, your screen will look something like this:

```
COLOR? GREEN
ANOTHER COLOR? PURPLE
NAME? RAINBOW
ANOTHER NAME? LESLIE ANNE

THE GREEN ROBOT
WITH THE PURPLE EYES
GRABBED RAINBOW WHILE
LESLIE ANNE RAN FOR HELP.
```

You can use this same program to create countless different sentences. In fact, you may even want to write a program that creates a whole story!

Important! When you choose variable names, be sure that you don't choose a word that is an Applesoft BASIC reserved word. Not even part of a variable name can be a reserved word. For example, a variable can't be named LETTER because the reserved word *let* is part of the name.

Reserved words are listed in Appendix E of this guide.

And don't forget the two-character rule: Applesoft BASIC only looks at the first two characters of a variable name. If, in the Crazy Sentence program, the variables were named NAME1$ and NAME2$, Applesoft would have created only one variable.

Printing Your Programs on Paper

If you have an Apple printer connected to your computer, you can print a copy of your program on paper using the LIST command.

1. Turn on your printer.
2. Type

   ```
   PR#1
   ```

   to direct all information to your printer.
3. Type

   ```
   LIST
   ```
4. If you're using 40 columns, type

   ```
   PR#0
   ```

   to turn off your printer and send information back to the screen.

   If you're using 80 columns, type

   ```
   PR#3
   ```

   instead of `PR#0` to turn off your printer and send information back to the screen.

PR What? PR#1 is shorthand for "print to the device attached to slot 1." Other models of the Apple II have **slots** inside the case where you plug in peripheral devices. Printers are customarily plugged into slot 1. For compatibility with other models of the Apple II, the Apple IIc understands the same shorthand—even though it doesn't have slots.

You've Only Begun to Program

You know enough now to write simple BASIC programs. To go further you need to learn some programming theory—how to divide your task into logical units before you start writing your program. Many schools offer classes in BASIC, and there are hundreds of elementary books on the subject. Look for a book that stresses the structured approach to programming.

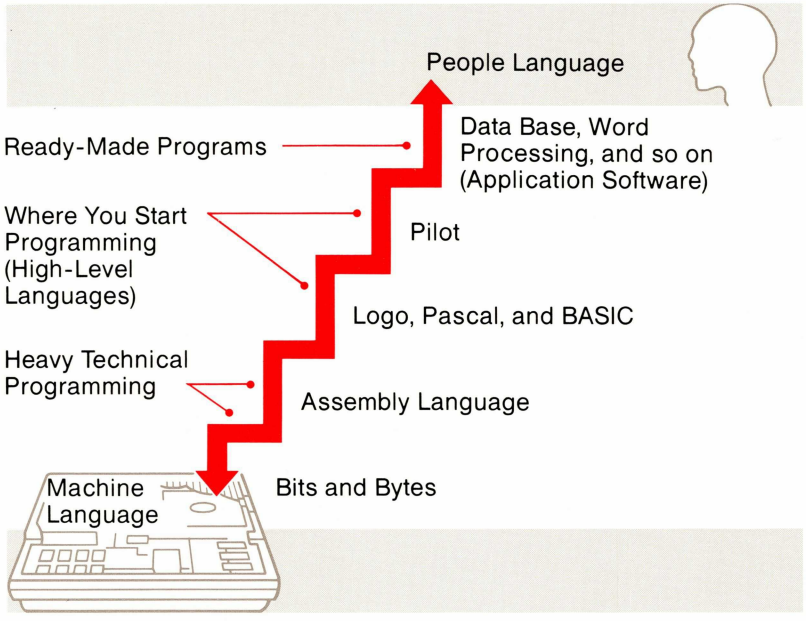
Other Computer Languages

BASIC and Logo are just two of the programming languages available for the Apple IIc. The following list briefly introduces a few other popular computer languages available for the Apple IIc.

- **Pascal:** Named after Blaise Pascal, a 17th century philosopher. This language is used in high school and college computer classes to teach programming because it stresses a systematic approach to programming. You break problems down into tasks and subtasks and then write your program in manageable modules. For more information, see the *Apple Pascal Language Reference Manual* and the *Apple Pascal Operating System Reference Manual.*
- **SuperPILOT (Programmed Inquiry, Learning, or Teaching):** This language is designed so that teachers can create computer lessons without learning all the ins and outs of a full-fledged programming language. For more information, see the *SuperPILOT Language Reference Manual.*
- **6502 Assembly Language:** This language is one small step up from the language of electrical impulses that constitutes the native tongue of the Apple IIc. It's a lot harder to learn than languages like Logo and BASIC, but it gives you faster programs (doesn't need as much translation), and it gives you more control over the operation of the computer. For more information, see the *6502 Editor/Assembler Manual,* the *Synertek Programming Manual*, and the *Synertek Hardware Manual.*

Figure 4-4 shows you how the various computer languages relate to each other, to you, and to the machine.

Figure 4-4. *Language Hierarchy*

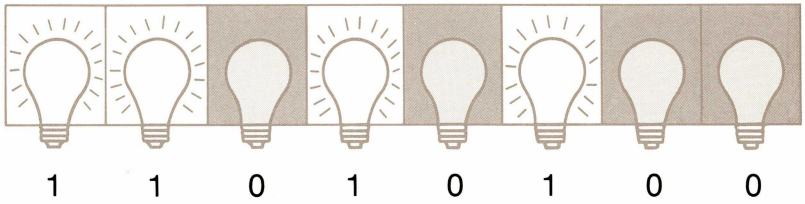


FYI: Bits and Bytes

The computer's brain is made up of switches—like light switches—so everything has to be reduced to on *and* off *before the computer can understand it. On is often represented by the number one. Off is represented by the number zero. It takes a string of eight zeros and ones to express* each *of the letters, numbers, and punctuation marks on the keyboard. Each zero or one in the string is called a* ***bit.*** *Each string of eight is called a* ***byte.*** *See Figure 4-5.*

Figure 4-5. *Eight Bits in a Byte*

Byte



One reason early computers filled whole rooms is because it took a separate vacuum tube to hold each zero and one. (The story goes that a moth flew into one of those tubes once and shorted out the entire computer. This gave rise to the term ***bug,*** *which now means there's something wrong with your program.)*

Talking this language of zeros and ones gets tedious, so programmers wrote translators (special programs) that allowed them to write instructions in a language more like English, letting the translators convert the instructions into machine language. Programmers still have to break their tasks down into small, logical steps, but they don't have to reduce the steps to zeros and ones.

Chapter 4 Summary

Writing a computer program involves breaking a task down into small steps and expressing those steps in terms the computer can understand.

Popular Programming Languages Available for the Apple IIc

Logo	Easy and fun to learn (with lots of emphasis on graphics), yet powerful enough for serious programming. Builds communication skills along with computer literacy.
BASIC	Beginners All-purpose Symbolic Instruction Code is built into the Apple IIc and many other personal computers, so there are lots of people who speak the same language. BASIC is good for beginners because it resembles English and is easy to learn.

Computer as Calculator

Because BASIC is built into the Apple IIc, you can use your computer as a calculator. Here are mathematical symbols the computer understands:

addition	+
subtraction	–
multiplication	*
division	/

ProDOS Commands

CAT	Short for **catalog.** Displays a list of what's on a disk.
SAVE	Stores your program in a file on a disk.
LOAD	Transfers a copy of a program on a disk into memory.

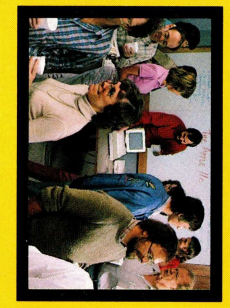
BASIC Commands

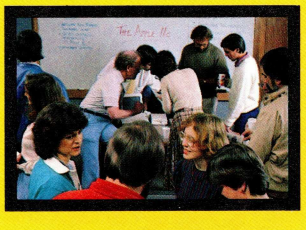
NEW	Erases whatever is in memory.
LIST	Displays the program in memory.
RUN	Executes the program in memory.

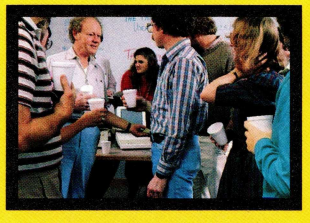
BASIC Statements

PRINT	Displays information on the screen.
INPUT	Lets you interact with someone using your program.
LET	Defines a variable.
END	Tells the computer the program is finished.

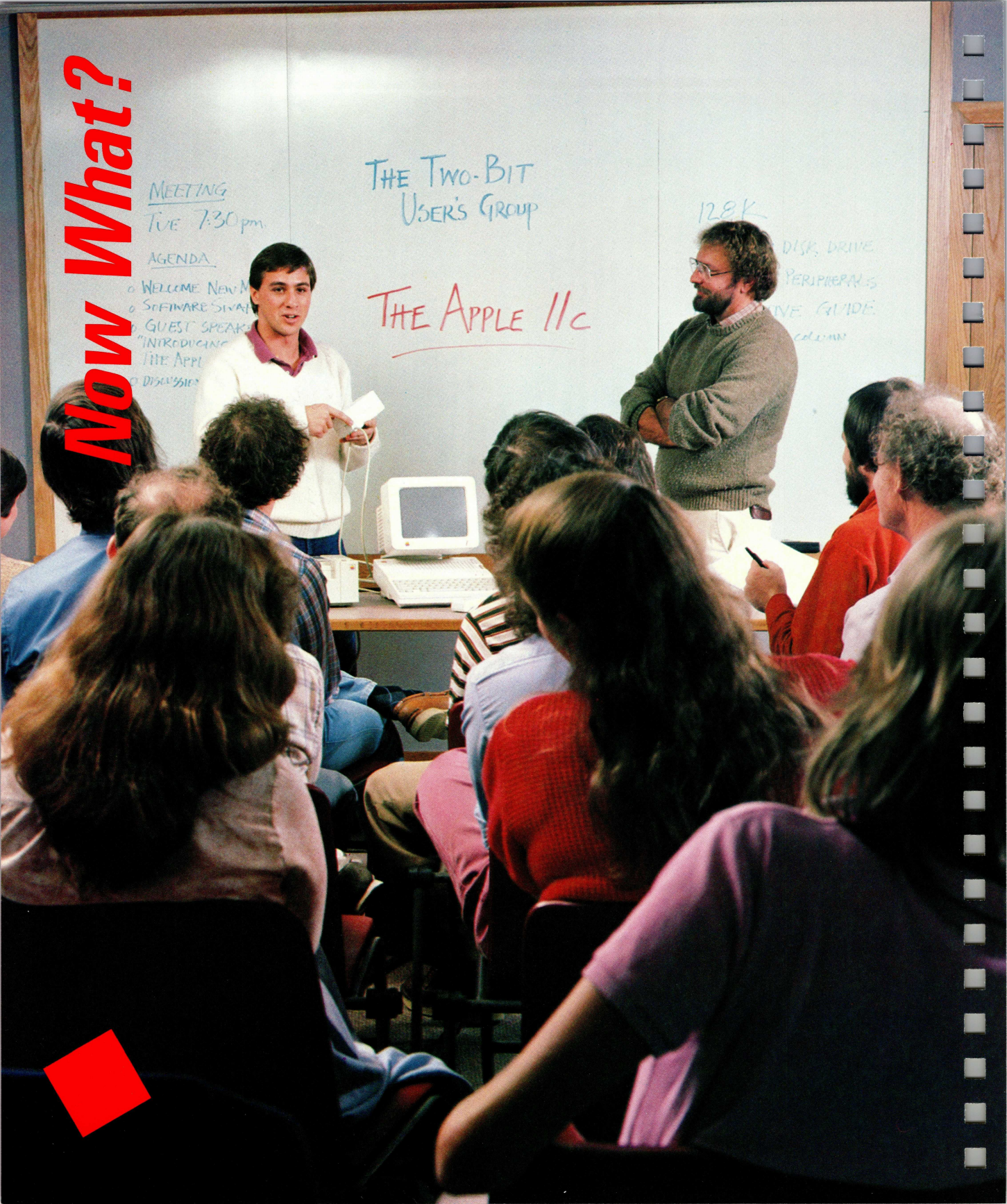
Chapter 5







Now What?


MEETING
TUE 7:30 pm
AGENDA
THE TWO-BIT
USER'S GROUP
THE APPLE IIc
128K
DISK DRIVE
PERIPHERALS

By now you've probably thought of lots of ways you can use the Apple IIc to lighten your workload and free up time for a few forays against the space invaders. The next step is to get some specific application programs (unless you plan to write all of your own programs, in which case you should invest in a good, elementary programming book).

If you want to write letters, term papers, or novels, go out and get a word processing program. If you want to catalog your comic book, butterfly, or coin collection, go out and get a data base program. If you have a task in mind, but don't know the type of application program that can handle it, talk to your dealer. Odds are he can help, because there's an application program for almost every task imaginable—from managing pig farms to tracking hurricanes. Each application program comes with a book that tells you how the program works.

By the Way: The disks packed with the guide are education software. *The Apple at Work,* for example, teaches you about word processing, data base, and spreadsheet programs, but it can't be used in place of the application program (AppleWorks) it describes.

Choosing Application Programs

Once you've settled on the type of application programs you want, it's a good idea to invest in a **software directory.** Software directories describe individual programs in detail and tell you how much they cost. Here's a list of some of the directories that describe and rank Apple software:

Addison-Wesley Book of Apple Computer Software 1983
The Book Company
11223 S. Hindry Avenue
Los Angeles, CA 90045
(213) 410-9466

The Blue Book for the Apple Computer
WIDL Video
5245 W. Diversey
Chicago, IL 60639
(312) 622-9606

Swift's 1983-1984 Educational Software Directory: Apple II Edition
Sterling Swift Publishing Company
7901 South I.H. 35
Austin, TX 78744
(512) 282-6840

VanLoves 1983 Apple II/III Software Directory
Advanced Software Technology Inc.
Box 2038
Overland Park, KS 66201
(913) 648-4442

Build your software collection gradually, the way you build your book and record libraries. And choose software the way you choose books—on the recommendations of friends. If you don't know many people who use computers, join an Apple users group.

User Groups

User groups, also known as **computer clubs,** are a good place to learn programming short cuts and tricks of the computer trade. There's usually a beginner's group, and there are plenty of old hands to help you learn the ropes.

Ask your dealer for the Apple club nearest you or contact:

International Apple Core
908 George Street
Santa Clara, CA 95050
(408) 727-7652

Computer Magazines

Computer magazines are another good source of information about software. Here's a list of computer magazines dealing exclusively with the Apple II family of computers. This list doesn't include the excellent general computer magazines, available at most magazine stands.

A+ Independent Guide for Apple Computing P.O. Box 2965 Boulder, CO 80321	A monthly publication focusing on how to use Apple products in home and business environments.
Apple Orchard 908 George Street Santa Clara, CA 95050 (408) 727-7652	A bimonthly publication of the International Apple Core, the worldwide federation of Apple computer user groups.
Call-A.P.P.L.E. 21246 68th Street So. Kent, WA 90032 (206) 872-2245	A monthly publication of the Apple Puget Sound Program Library Exchange, the world's largest Apple users group. This magazine focuses on somewhat technical information for hardware hobbyists and intermediate and advanced programmers.

inCider 80 Pine Street Peterborough, NH 03458 (603) 924-9471	A monthly publication for new users.
Nibble Box 325 Lincoln, MA 10773 (617) 259-9039	A magazine for new programmers; published eight times a year.
Peelings II Box 188 Las Cruces, NM 88004 (505) 526-8364	A magazine featuring evaluations of Apple II hardware and software; published nine times a year.
Softalk 11160 McCormich Street No. Hollywood, CA 91603 (213) 980-5074	A monthly magazine focusing on Apple users and interesting ways to use Apple computers.

Computer Books

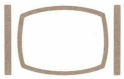
There are also a number of excellent books about computers and computer programming. There are 20 new titles a week, so it's impossible to give you a list of all the computer books on the market. Ask your dealer to recommend some books in your area of interest.

Adding Pieces to Your Computer System

Just as there are all sorts of application programs you can get for your computer, there are dozens of peripheral devices that can make your computer a more powerful machine. Use Table 5-1 to decide which peripheral devices complement the application programs you have in mind.

Important! If a device requires you to plug something into a **slot** inside the computer, it's designed for other models of the Apple II; *it won't work with the Apple IIc.* Ask your dealer if you have any questions about whether a particular device will work with the Apple IIc.

Table 5-1. *Adding Pieces to Your Computer System*

Word Processing	 Monitor		 Printer	 External Disk Drive	
Data Base	 Monitor	 External Disk Drive	 Printer *(Optional)*	 Mouse *(Optional)*	
Spreadsheet	 Monitor	 External Disk Drive	 Printer *(Optional)*	 Mouse *(Optional)*	
Education	 Color TV	or	 Monitor		
Games	 Color TV	or	 Monitor	 Hand Controls or Joystick	 Mouse *(Optional)*
Communication	 Monitor	 Modem	 Printer *(Optional)*		
Graphics	 Color TV	or	 Monitor	 Plotter	 Mouse *(Optional)*
Programming	 Monitor or TV *(For elementary programming)*	 External Disk Drive *(Necessary for Pascal; optional for BASIC and Logo)*	 Printer *(Optional)*	 Mouse *(Optional)*	

Should you buy a video monitor or can you get by with your TV? What about an extra disk drive? This section will answer these questions (and many more) by describing and illustrating the most popular peripheral devices for the Apple IIc.

Monitor or Television Set

A **radio-frequency (RF) modulator** makes it possible for a TV set to tune in signals from the computer.

Which display device you use with the Apple IIc depends on what you do with your computer. If you use your computer for elementary programming or for playing computer games, you can use your television set (with an **RF modulator**) for a display device. But if you plan to use your computer for word processing, financial planning, or some other business application, a video monitor is a must.

Televisions can't display 80 characters on a line clearly the way monitors can. They can display only 40 characters on a line. While 40 characters a line is fine for some applications (games and educational programs), it's too narrow for business letters or electronic spreadsheets. Figure 5-1 gives examples of 40- and 80-column displays.

Figure 5-1a. *40-Column Display Versus 80-Column Display. This is a 40-column display.*

```
File: holiday          REVIEW/ADD/CHANGE
========================================

Dear Pat and Dick,

Sure is good to be writing you again. I
can't believe it's been a year!

About the biggest news here is that we
bought an Apple computer. In fact, I'm
using it right now to write you this
letter. And you know if butter fingers
me can get it to work, it's got to be
easy to use!

                          Love,

                          Harry and Nan
```

Figure 5-1b. *40-Column Display Versus 80-Column Display. This is an 80-column display.*

```
File: holiday                  REVIEW/ADD/CHANGE                  Escape: Main Menu
================================================================================
Dear Pat and Dick,

Sure is good to be writing you again. I can't believe it's been a year!

About the biggest news here is that we bought an Apple computer. In
fact, I'm using it right now to write you this letter. And you know if
butter fingers me can get it to work, it's got to be easy to use!

Nan and the kids are doing fine. Nan's been writing a lot of articles and
I'm still killing myself at the office. In my "spare" time I'm managing
Jimmy's ball team and let me tell you, those kids are GOOD.

How are your kids, by the way?  I'd really like to hear from you. Why not
buy a computer? It makes letter writing a breeze. Anyway, happy new
year and do keep in touch.

                                                        Love,

                                                        Harry and Nan
```

Monochrome video monitors come in three varieties: black and white, black and green, and black and amber. If you need or want a sharp clear picture and color, you might want to look into a color monitor. Color monitors cost more than monochrome monitors, but they're ideal for computer graphics and for displaying business charts and graphs.

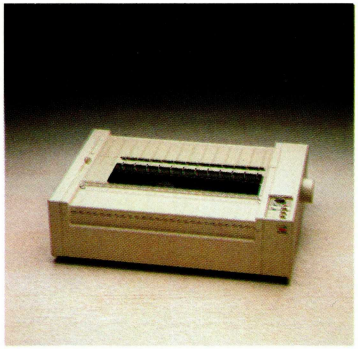
If you alternate between using a monitor and a television, make sure to set the 80/40 Column switch before starting up the program. The switch must be set to 40 columns (down) for TV and can be set to 80 columns (up) or 40 columns (down) for monitor. If you discover that the switch is set incorrectly after starting a program, it's no big deal. Just change the setting, and restart the computer.

For how to restart the computer, see "Starting Up With the Power On" in Chapter 1.

40 or 80 Columns? Some programs are written in the 40-column format and will appear in the 40-column format even if you have the 80/40 Column switch set to 80 columns. Other programs are designed exclusively for the 80-column format and won't function properly if the switch is set to 40. In other words, you can't use such programs if a television set is your only display device.

Finally, some people prefer the 40-column display for some programs even though they have a monitor and could display the program in the 80-column format. Experiment with the switch and you'll quickly discover your options and preferences.

Figure 5-2. *The Apple Imagewriter*



With serial printers, the computer sends information to the printer one bit at a time (it takes eight bits to make a byte, or one character). The computer sends parallel printers information eight bits at a time.

Printer

A printer creates a paper copy of information you create with your computer. You can use a computer without a printer, but it's not convenient or practical to, for example, mail your letters on disks. For some people, a printer is a must.

Printers come in a variety of prices and vary correspondingly in print speed, quality, and loudness. Ask your dealer for a demonstration before you buy. Printers also vary in degree of compatibility with your computer. Make sure the printer you buy works with the Apple IIc—get a demonstration with the programs you'll be using—before you bring it home.

Make Sure It's Serial: The Apple IIc is designed to work only with serial printers. You can't use a parallel printer.

One of the most versatile printers is the dot matrix printer. See Figure 5-2.

Dot matrix printers form characters with patterns of dots. They're fast, affordable, and ideal for graphics. They're fine for personal letters and memos. The main advantage of dot matrix printers is that you can use a wide variety of typefaces and type sizes.

Important! Before using a printer with the computer, be sure to read the section on configuring serial ports in the utilities booklet for the Apple IIc.

Warning
If you alternate between plotter and printer in port 1, make sure the power is off before you make the switch.

Figure 5-3. *The Apple Color Plotter*

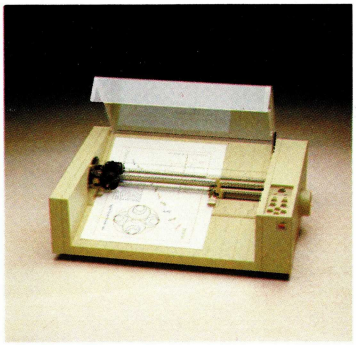
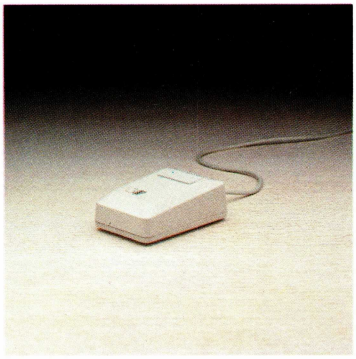


Figure 5-4. *Disk Drive*

Figure 5-5. *The Apple Mouse*



Plotter

Plotters can reproduce graphs, charts, floor plans, and other graphics you create with your computer. Figure 5-3 shows you the Apple Color Plotter.

Make sure the plotter you choose has a serial interface like the Apple Color Plotter.

Second Disk Drive

A disk drive is an indispensible part of your computer system—that's why one is built in to your Apple IIc. It's convenient to have a second disk drive so that you can keep your application program disk in the built-in disk drive (drive 1) and your data disk in drive 2. (A few programs require you to have two disk drives.)

Having two disk drives also makes it easier to make copies of data disks—a must, since disks are perishable. Figure 5-4 shows you a disk drive you can attach to your Apple IIc.

Mouse

So far you've been communicating with the computer through the keyboard. Some programs also let you communicate with the computer using the mouse (see Figure 5-5). Rolling the mouse across your table or desk moves a pointer on the screen. With some programs, you can use the mouse to draw pictures. With other programs, you can use the mouse to select topics from a menu (move the pointer to the topic you want and press the mouse button).

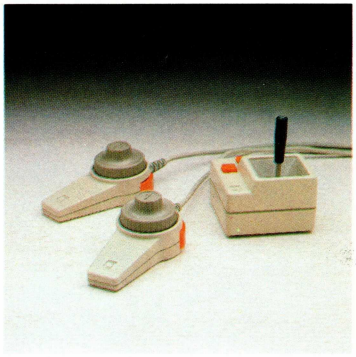
Figure 5-6. Modem

Modem

A **modem,** short for **modulator/demodulator,** links your computer by telephone to other computers and information services. If you plan to tap into a large computer library for stock quotes, medical, or legal research, or use your computer for electronic banking, you'll need a modem and a communications program like Apple Access II.

Different modems send and receive information at different speeds. The speed is measured in **bits per second (bps),** often referred to as **baud.** The most common baud rate is 300. You also can get modems for the Apple IIc that send and receive data at 1200 baud. They cost more, but they're four times faster—a valid consideration because you're often paying long distance phone rates. (Some programs can't handle 1200 baud, so make sure your program can cope with the higher speed before you buy the 1200 baud modem.) Figure 5-6 shows a popular modem you can attach to your Apple IIc.

Figure 5-7. Hand Controls and Joystick



Joystick or Hand Controls

If you plan to use your computer for games—and who doesn't occasionally—you'll want to invest in a joystick or hand controls. Not all games require a joystick or hand controls, but the vast majority do.

Hand controls and joysticks control the movement of creatures or objects in game programs. With hand controls, you control movement by turning a pair of knobs—one in each hand; with a joystick, you maneuver a joystick. Both hand controls and joysticks have buttons you press to fire torpedos, throw forward passes, or anything else the programmer can dream up. Figure 5-7 shows you what the hand controls and joystick look like.

You're Not Alone

As you build your software library and add peripheral devices to your computer system, you'll occasionally hit stumbling blocks. Where can you turn? This book is a good place to start. If you can't find the answer here, talk to your dealer. He's the best source of information on the Apple II family of computers. And don't stop there—let us know what the question or problem was by filling out the Tell Apple card at the back of this guide.

You Can Take It With You

The Apple IIc is a transportable computer—you can carry it with you from home to work and back again. And this is a portable owner's guide. You can carry the lessons you've learned into every session at the computer. And you can return to the guide for refresher courses any time you need them.

Now that you've finished the guide, the next step is to

- get an application program and read the manual that came with it, or
- get a book and learn programming.

Whether you decide to write your own programs or use application programs, you'll need to know how to format disks and how to make copies of disks. These and other utilities are explained in the utilities booklet for the Apple IIc. Some application programs have utilities—like copying, deleting, and formatting—built in. So you might want to check the manual that came with the application program before reading *System Utilities*.

From here on out, the best teacher is experience. You won't really know what you know, or what you don't know, until you've written your first program or composed your first letter with a word processing program. Your most unforgettable lessons will come from trial and error. Don't hesitate to ask friends for help, or to offer help when experience has turned you into a veteran. That's what it's all about—getting personal about computers.

Thanks for your time. Enjoy your computer.

Chapter 5 Summary

Popular Peripheral Devices

Display Device	A video monitor or television set. It displays instructions from the program to you, and shows you what you've typed into memory.
Printer	Produces a paper copy of information you create with the computer.
Plotter	Draws a paper copy of the graphics you create with the computer.
Disk Drive	Writes information on disks and reads information from disks.
Mouse	Moves a marker across the screen in some programs.
Modem	Links your computer to other computers and information services by phone.
Joystick and Hand Controls	Move objects and creatures around the screen.

Where to Go for Help and Information

- User groups
- Software catalogs
- Computer books and magazines

Appendixes

Ask Apple

Now that you've spent some time with the Apple IIc, you probably have lots of questions that never occurred to you before you actually tried out a computer. In this section, the questions new Apple users frequently ask are answered. If you have other questions, ask your dealer, people at an Apple users group, or send your inquiry to one of the Apple magazines.

Can I run all Apple II and Apple IIe software on my Apple IIc?

Yes, you can run the overwhelming majority of Apple II and Apple IIe software. You can't use software that requires more than two disk drives or software that requires a peripheral card. The Apple IIc has no slots, so it can't run software that uses devices that must be connected through cards in slots. It also can't run software that uses early DOS (3.1, 3.2).

Can I run software for other computers on the Apple IIc?

The software that runs on the Apple IIc is software that uses one of Apple's operating systems: ProDOS, DOS 3.3, or Pascal. Software written for other computers doesn't use these operating systems and consequently won't work on the Apple. You will find, however, that almost all major software publishers have versions of software that run on the Apple IIc.

Sometimes I hear horror stories about people typing pages and pages of information and then having it disappear. How can I prevent this from happening to me?

Save! Save! Save! Every program has a way for you to transfer information from the computer's memory to a file on a disk. Once stored on a disk, information is safe, or at least a lot safer than it is when it's only in your computer's memory. That's because information stays in memory only as long as the power is on and the computer is working properly. Power surges, electrical failures, computer failures, and klutzy friends who trip over power cords are rare, but they invariably happen just after you've written your

cleverest program or most heartfelt letter. By saving frequently to a disk (at least every 10 minutes) you're guaranteed that, no matter what, you won't lose too much valuable information. But saving to a disk is only half the secret. At the end of the day, always make a backup copy of your disk. No matter how careful you are, disks get damaged. The only way to guard against a damaged disk is to have a spare copy.

Can software break?

Yes, sometimes software just doesn't work the way it's supposed to. But then again, sometimes hardware doesn't work the way it's supposed to, and still other times, users don't work the way they're supposed to. What this means is that, although software may appear broken, the problem often is with hardware or, believe it or not, the user. If you think your software is broken, try reading the manual. It's possible that the software is meant to work the way it's working. If, after reading the manual, you still think the software is not working correctly, do a repeat test: Note the error and then follow the same sequence of steps to see if you can get the error to happen again. Assuming it does, your next task is to figure out whether the problem's with a piece of hardware, such as the computer or disk drive, or with the software. Try running other programs on your computer. If they also don't work properly, chances are that hardware is the problem. If you try running the broken software on your dealer's computer and have the same problem, you probably have a real software bug on your hands. Once you've caught a bug, report it to your dealer. He may have a patch (a corrected piece of software), or he may be able to help you work around the problem. If your dealer can't help, contact the software publisher directly; many have toll-free telephone numbers.

How much do I need to know about operating systems?

Unless you're planning on some heavy-duty programming, using a general utilities disk is the closest you need to get to an operating system. If, on the other hand, you've decided that programming is for you, you'll probably need more in-depth knowledge. If you'll be doing BASIC programming, read *BASIC Programming With ProDOS* and the *ProDOS Technical Reference Manual.* Some BASIC programmers may want to write programs using DOS, the operating system Apple used before ProDOS. If you want to write DOS programs, you'll need to purchase the *DOS User's Kit.* Finally, if you want to write Pascal programs, you'll need the Pascal operating system and the accompanying manual. Logo uses the ProDOS operating system; the Logo manuals explain how to use ProDOS with Logo.

What's booting?

In computer lingo, booting means starting up your computer. When you turn on the power, a built-in program (the Monitor program) is put into memory, where it turns on the disk drive. The disk drive then tranfers the startup program on the disk to the computer's memory. All this must happen before the computer is ready to work. So, quite literally, booting is letting the computer pull itself up by its own bootstraps, which is how the term originated.

Is my Apple very fragile? I keep thinking I'm going to break it.

Your Apple is about as fragile as your television set or stereo. You will never break your Apple by pressing the wrong keys, just as you won't break your TV by turning to the wrong channel.

Are disks fragile?

Yes, believe it or not, disks are a lot more susceptible to damage than your computer. In fact, damaged disks are probably the greatest cause of what people think is a broken computer or broken software. Dust is a disk's greatest enemy. To guard against it, always keep disks in their envelopes. Also, keep disks away from extreme heat, sunlight, liquids, and anything that contains a magnet, like a telephone. It's best to store disks in a disk holder. (If you don't have a special disk holder, a shoe box works fine.) Finally, when preparing disk labels, write them first, then stick them on the disk. If you must write on a label that's already on a disk, make sure you use a felt-tip pen, rather than a ball-point pen. Using a pencil or ball-point pen could dent the surface of the disk.

Is it OK to use both sides of a disk?

Not usually. The disks that are part of the guide are specially made for two-sided use.

Do I need an external disk drive?

No, you can use almost all software with one disk drive. A second disk drive just makes using your computer a little easier. The time when a second drive comes in most handy is when you're making backup copies of disks. If you copy a disk using only one disk drive, you have to do a lot of swapping, that is, swapping your original and backup disks in and out of the built-in disk drive. If you have an external disk drive, you can put your original disk in one drive, your backup in the other, press a few keys, and then let your computer do the work.

How much electricity does my Apple use?

Your Apple IIc system, complete with monitor, uses less electricity than a 100-watt light bulb.

Should I turn off my Apple after using it?

If you're going to be away for more than an hour or two, it's a good idea to turn off your computer, just so you don't waste electricity. If you're just taking a stretch or grabbing a drink, leave your Apple on (but save what you're working on before you get up).

Do you recommend opening up the Apple IIc so I can see how it works?

Absolutely not. First of all, opening up your Apple IIc voids your warranty. Second, your computer's innards aren't much more interesting than your toaster's. If you want to learn how the Apple IIc works, start up *The Inside Story* disk. It shows what the inside of the computer looks like and what its parts do. Apple IIe and II Plus owners need to open their computers to attach peripherals, like printers and modems. The Apple IIc lets you connect peripherals without opening it up.

Do I need a power surge protector to make sure my computer doesn't blow up?

First of all, computer blow-ups and smoke-outs are things of the past. Today, about the most dramatic result of a power surge or electrical storm is lost data. Even losing data is extremely rare, however, since your computer has a built-in mechanism to guard against changes in electrical power. The only people who may want to invest in a protector are those who are extremely cautious and those who live in areas that are particularly prone to electrical storms, hurricanes, and electrical failures.

Do I need to touch type to use a computer?

No, you don't need to know how to touch type. Lots of people who use the hunt and peck method (that is, they hunt for each key as they need it) do just fine. In fact, hunt and peckers report greatly increased typing speeds after a few days with a computer. If you want to learn to touch type, you may want to buy a typing program. These programs give you typing instructions right on the screen.

How do I know whether to set the Apple IIc display to 40 or 80 columns?

If you're using a television, set the Apple IIc display to 40 columns. That's because televisions don't have fine enough resolution to display 80 columns worth of information. If you're using a monitor, set the Apple IIc 80/40 Column switch to 80 columns. Many application programs, particularly word processing and spreadsheet programs, require an 80-column display.

What's K and how much do I need?

To understand what a K or kilobyte is, you first need to know what a byte is. A byte is the space one letter or digit takes up in the computer's memory. A kilobyte is equal to 1024 bytes. That means that a computer with 128K, like the Apple IIc, can store a little more than 128,000 characters in its memory. The more kilobytes your computer has, the more information it can store and the larger the programs it can run. 128K is enough memory for just about all home and business applications.

Is it bad for your eyes to look at the screen for too long?

We don't know of any studies that have found that staring at a monitor is harmful to your eyes. Some people do, however, report getting headaches or eye strain after lengthy tête-à-têtes with their computer. Current thinking is that these symptoms are caused by sitting in the same position for long periods rather than from the way information is displayed. In any event, it's a good idea to get up and stretch, just to give your eyes a rest and your body a chance to get moving.

How did Apple get its name?

The name *Apple Computer* was chosen late one afternoon as Steve Jobs and Steve Wozniak, Apple's founders, faced the deadline for filing a Fictitious Name Statement, part of the business licensing procedures. After volleying names back and forth with Wozniak for hours, Jobs looked at the apple he was eating and decided that, unless he or Woz arrived at something better by five o'clock, they would call the company Apple. Five o'clock came and went; Apple was the new company's name.

Is there such a thing as the Apple I?

Yes. The Apple I was the first computer that Steve Jobs and Steve Wozniak created. The computer had no case, and you had to purchase your own keyboard. There were no disk drives back then, so all programs had to be stored on cassette tape. Really, though, the Apple I was the most user friendly computer of its day since it required only a minimum of time and technical know-how to put it together. About 200 Apple I's were built. The computer was designed at night in a lab at Hewlett-Packard and manufactured in the garage of Steve Jobs' parents. Unless you're a collector, the Apple I isn't much of a bargain—the computer sells for between $10,000 and $15,000.

Did the Apple I have a manual?

You bet. It was about eight pages long.

Who designed the Apple logo?

The Apple logo was designed by Regis McKenna, a Silicon Valley public relations firm. The original Apple logo was a design of Newton under an Apple tree. But Newton didn't lend himself to reproduction, so Regis McKenna was called in to create an insignia that could be replicated more easily.

Should I worry if I find myself talking to my Apple IIc?

No. Lots of people talk to their computers, especially when they're just learning to use them. What's nice about the current crop of computers is that they can't understand what you're saying. In a decade or so, you may have to watch your language.

Troubleshooting

Making mistakes is part of the learning process. In fact, if you don't make a few mistakes, you're not being very adventurous, and you're probably typing too slowly. So don't be afraid of a few beeps and blinking error messages. It comes with the territory.

Symptom	Cause	Remedy
SYNTAX ERROR on the screen.	Some programs require all your entries to be in uppercase. You typed something in lowercase, or the program doesn't recognize the command or instruction you typed, maybe it's misspelled.	Press [CAPS LOCK] down and type your entry again. Check your typing. If you made a mistake, retype the command.
I/O ERROR on the screen.	You put the wrong disk in the disk drive, probably a blank (unformatted) one, or there's a poor connection between your computer and your printer or external disk drive.	Take the disk out of the disk drive and see if it's the one you thought it was. If it's not, replace it, and repeat what you were doing when you got the error message. Check to make sure your printer and disk drive are securely plugged into the computer.
Nothing happens when you turn on the power. (The built-in disk drive doesn't make a sound.)	The power cord isn't plugged into the wall or into the computer.	Turn the power switch off; then make sure the power cord is plugged into a power source and plugged into the computer. Then try again.

Symptom	Cause	Remedy
Nothing appears on the screen when you turn on the power (even though the Disk Use light comes on and you hear a whirring sound from the disk drive).	The monitor isn't turned on, the monitor isn't plugged in, or monitor contrast or brightness isn't adjusted properly.	Turn on the monitor. Plug in the monitor. Adjust the monitor contrast or brightness knob.
`CHECK DISK DRIVE` appears on the screen.	There's no disk in the built-in disk drive, or the disk in the built-in disk drive isn't formatted.	Put a program disk in the built-in disk drive and repeat the startup procedure.
Blurry screen image with very tiny letters.	You are using a television set for a display device and the 80/40 Column switch above the keyboard is set to 80 (the monitor setting).	Change the 80/40 Column switch to 40 (down) and start up again.
Blurry 80-column display on a television set, even though the 80/40 Column switch is set to 40.	Some Apple IIe application programs don't check the 80/40 Column switch setting and assume that you want 80 columns.	Use a monitor (if available), or get software designed for the Apple IIc.
Screen is only half filled with characters.	You are using a monitor for a display device and the 80/40 Column switch above the keyboard is set to 80 (the monitor setting) and the program is written for 40 columns.	Change the 80/40 Column switch to 40 (down) and start up again.
Scrambled text (characters run off edge of screen).	Your 80/40 Column switch is set to 40 (down) and the program is designed for 80 columns.	If you have a monitor, set 80/40 Column switch to 80 (up) and start up again.
Unusual characters on the screen when you start up an application program designed for earlier models of the Apple II.	The application program is trying to use memory space now reserved for mouse firmware.	Use the application program on an Apple IIe (if available) or get software designed for the Apple IIc.
Screen image is too bright or too dim.	Monitor contrast or brightness isn't set properly.	Adjust the monitor contrast or brightness knob until the display is easy to read.

Symptom	Cause	Remedy
Sound is too low or too loud.	The speaker volume isn't set properly or you have headphones plugged in.	Adjust the speaker volume control on the lower-left side of the Apple IIc until the sound is set to a comfortable level for you (and those around you). Unplug your headphones (or use them).
Program disk won't start up; disk drive keeps whirring.	Disk is bad.	Press CONTROL-RESET to stop disk drive. Contact the dealer or manufacturer.
Program disk won't start up.	Built-in disk drive needs to be aligned or adjusted.	Have your dealer adjust the disk drive. In the meantime, you can start up the disk from the external disk drive (if you have one) by following these steps: **1.** Put the program disk in the external disk drive. **2.** Hold down CONTROL while you press RESET. **3.** When you see], type PR#7 and then press RETURN.
Information not recording on the disk; unable to load previously saved information; unable to catalog data disks.	Disk is not being settled properly in the disk drive.	When you insert a disk into the drive, be sure that it is settled into place. Close the door completely. See "Verify That a Disk Is Readable" in Chapter 2 of the *System Utilities* manual.

General Troubleshooting Tips

Specific application programs have their own set of error messages. The messages are either self-explanatory or explained in the manual that came with the application program.

Some programs are better than others at shielding you from disaster. And some programs are friendlier than others when it comes to error messages. Friendly programs will tell you what you did wrong and how to fix it. Unfriendly programs will beep and display a cryptic message. If you run into an unfriendly program that doesn't tell you what to do about your mistake, try these remedies:

- Check your typing.
- Press [CAPS LOCK] down. (Some programs only accept entries in uppercase.)
- Check the manual to see if you did the procedure correctly.
- Get help from someone who knows how to use the program.
- Get help from your dealer.

Stopping a Runaway Program

Most programs give you an easy way out. If your program doesn't have a Quit option on the menu, try these escape methods (until you find the one that works):

- Press [Q] for Quit.
- Press [ESC].
- Hold down [CONTROL] while you press [C].
- Press [CONTROL]-[C] and then [RETURN].
- Hold down [CONTROL] while you press [RESET].
- Hold down [ó] and [CONTROL] while you press [RESET].
- Turn off the power.

FYI: Programs That Won't Start Automatically

If you put one of your own disks in the built-in disk drive, start it up, and find yourself staring at a screen with just a prompt and a cursor, try this:

Type CATALOG *and press* RETURN.

CATALOG is a special word, or command, that tells the computer to produce a list of what's on the disk. If this command produces a list of programs like the one in Figure B-1, you can run any of the programs with the letter A *in front of them by typing* RUN, *the name of the program, and then* RETURN. *For example, you might type* RUN BINGO *and then press* RETURN. *You can run some of the programs with the letter* B *in front of them by typing* BRUN, *the name of the program, and then* RETURN. *For example, you might type* BRUN BOZO *and then press* RETURN.

Figure B-1. *A Typical Catalog*

```
DISK VOLUME 254

 A 006 HELLO
 A 031 GO FISH
 A 040 GUNNY SACK
 A 060 SPACE OUT
 A 045 BINGO
 B 039 BOZO

]
```

You're most apt to run into this situation if you're using programs written by friends. Most packaged programs start by displaying a menu or a set of instructions.

Apple II Family Differences

There are thousands of programs for the Apple II family of computers. You can use most of them on the Apple IIc if you take into account the differences between the Apple IIc and the rest of the Apple II family. These differences are summarized in Table C-1.

Table C-1. *Apple II Family Differences*

	Apple IIc	**Apple IIe**	**Apple II, II Plus**
Memory Capacity	128K	64K (expandable to 128K)	16K-48K (expandable to 64K)
Additional Features	Built-in disk drive (connector for second drive) 80-column capability. Ports for serial printer, serial plotter, modem, mouse, hand controls, and joystick.	Slots for 4 disk drives, a printer, 80-column display, other peripheral devices.	Same as Apple IIe.
	No slots		
Keyboard	Uppercase, lowercase, and special keys.	Same as Apple IIc.	Uppercase only.

Memory Capacity

The Apple IIc has 128K (or 131,072 bytes of **RAM, random-access memory**)—twice the memory capacity of the standard Apple IIe. This means the Apple IIc has the memory capacity to run all software designed for other models of the Apple II, but other Apple II's may not be able to run software designed for the Apple IIc.

Additional Features

The Apple IIc has built in interfaces for peripheral devices. These are called **ports.** The Apple IIe has slots for peripheral cards.

The Apple IIc has built-in 80-column capability, a built-in disk drive, and a built-in connector for one additional disk drive. It also has connectors for a serial printer, plotter, modem, mouse, hand controls, and joystick. These built-in connectors are called **ports.**

A **peripheral card** is a printed circuit board (similar to the main logic board, only smaller).

Other models of the Apple II have slots, long narrow connectors, inside the computer where **peripheral cards** are plugged in to connect disk drives, printers, and other devices to your computer. Printers are generally connected through a card in slot 1, modems through slot 2, disk drives through a disk controller card in slot 6.

Programs written for other Apple II's often ask for the slot number of your printer or disk drive. The Apple IIc doesn't have slots, but you can use these programs by supplying the slot number that corresponds to your printer, modem, or disk drive port:

Device in Port 1	Slot 1
Device in Port 2	Slot 2
Built-in Disk Drive	Slot 6, Drive 1
External Disk Drive	Slot 6, Drive 2

Because other models of the Apple II don't have built-in disk drives, programs and manuals written for those models distinguish between the startup drive and other drives by number. The startup drive is drive 1.

The controller card that connects disk drives to the computer on earlier Apple II's can accommodate two disk drives. Programs distinguish between the two drives connected through slot 6 by drive number.

Starting From Drive 2: If you ever have trouble starting up a program from the built-in disk drive, you can start a program from the external drive, drive 2, by following these steps:

1. Put the program disk in the external drive.
2. Hold down [CONTROL] while you press [RESET]. (This turns off the built-in disk drive.)
3. Type PR#7 and press [RETURN]. (This turns on the external disk drive, drive 2.)

(This procedure only works for ProDOS-based programs.)

Some printers designed for other models of the Apple II require you to set certain switches on the card that plugs into the computer. The printer interface is built into the Apple IIc so you can't set the switches manually, but you can do the equivalent using a program described in the booklet on utilities for the Apple IIc.

Keyboard

You couldn't type lowercase letters on the Apple II and Apple II Plus, so programs written for those machines only recognize uppercase letters. Those programs will run on your Apple IIc when you press down [CAPS LOCK].

The Apple IIc keyboard is exactly the same as the Apple IIe keyboard except for the location of [RESET], so you should have no problem using Apple IIe programs on the Apple IIc. But both the Apple IIc and the Apple IIe have some keys that the Apple II and Apple II Plus didn't have ([Ó], [Apple], [↑], and [↓]). Older programs haven't taken advantage of these keys, but you can still run the older programs on your Apple IIc.

The Apple II and Apple II Plus have a REPT key that you could press down to make other characters repeat. The Apple IIc and Apple IIe keys repeat automatically if you hold them down.

Apple IIc Specifications

Standard Features

- 65C02 eight-bit microprocessor
- 128K bytes of RAM
- 16K bytes of ROM
- Applesoft BASIC in ROM
- Disassembler and machine language Monitor program in ROM
- Built-in disk drive with controller for second disk drive (slot 6 equivalent in Apple IIe)
- 80-column display (built-in AUXILIARY slot equivalent in Apple IIe)
- Built-in uppercase and lowercase character display
- 63-key keyboard
- Built-in speaker with headphone jack and volume control
- Hand control/joystick/mouse capability
- RF modulator
- Built-in serial interface for printer (slot 1 equivalent in Apple IIe)
- Built-in serial interface for telephone modem (slot 2 equivalent in Apple IIe)
- Color graphics capability
- 12-volt internal power supply
- Power transformer in power cord

Languages Available From Apple

- Applesoft BASIC (built in)
- Pascal
- FORTRAN
- SuperPILOT
- Logo
- 6502 Assembly Language

Operating Systems Available

- ProDOS
- DOS 3.3
- Pascal

Popular Accessories

- Mouse
- Color or monochrome monitor
- Flat panel display
- 5¼-inch-disk drive
- Dot matrix printer
- Telephone modem
- Hand controls, joystick
- Color plotter
- Headphones

For technical information, see the *Apple IIc Reference Manual.*

Reserved Words

The following words are reserved for use by Applesoft BASIC and ProDOS. Don't use them as variable names or as part of variable names.

&
-

ABS
AND
APPEND
ASC
AT
ATN

BLOAD
BRUN
BSAVE

CALL
CAT
CATALOG
CHAIN
CHR$
CLEAR
CLOSE
COLOR=
CONT
COS
CREATE

DATA
DEF
DEL
DELETE
DIM
DRAW

END
EXEC
EXP

FLASH
FLUSH
FN
FOR
FP
FRE

GET
GOSUB
GOTO
GR

HCOLOR=
HGR
HGR2
HIMEM:
HLIN
HOME
HPLOT
HTAB

IF
IN#
INPUT
INT
INVERSE

LEFT$
LEN
LET
LIST
LOAD
LOCK
LOG
LOMEM:

MID$

NEW
NEXT
NORMAL
NOT
NOTRACE

ON
ONERR
OPEN
OR

PEL
PEEK
PLOT
POKE
POP
POS
POSITION
PREFIX
PRINT
PR#

READ
RECALL
REM
RENAME
RESTORE
RESUME
RETURN
RIGHT$
RND
ROT=
RUN

SAVE
SCALE=
SCRN(
SHLOAD
SIN
SPC(
SPEED=
SQR
STEP
STOP
STORE
STR$

TAB(
TAN
TEXT
THEN
TO
TRACE

UNLOCK
USR

VAL
VLIN
VTAB

WAIT
WRITE

XPLOT
XDRAW

Guide to Service and Support

To help you maximize the performance you'll get from your system, Apple Computer, Inc. has established a worldwide network of full-support dealers. Your local dealer has a complete package of services to offer you. Each has an Authorized Service Center with specially trained technicians. The center is equipped with the latest diagnostic programs and an inventory of replacement parts so you'll get fast and efficient service.

If you need answers to technical questions or information about product updates, your full-support dealer can help you. Apple's Technical Support organization backs each dealership to assure prompt, reliable assistance.

Service

If service is required, you should take the system (or Apple product) to your dealer. If you have moved, take it to the nearest Authorized Service Center.

There are more than 2100 Authorized Service Centers throughout the world. For the location nearest you, call (800) 538-9696 in the United States or write

Apple Computer, Inc.
Attn: Customer Relations
20525 Mariani Avenue
Cupertino, CA 95014

During the initial warranty period, your dealer will repair or replace, at no charge, any Apple-manufactured product that proves to be defective. Apple also offers the AppleCare℠ Carry-in Service Agreement, which will keep this same protection in force for an additional year. This coverage is available through your full-support dealer. (See "AppleCare" for information.)

Support

Become thoroughly familiar with your manuals, then if you still have questions call on your dealer for assistance.

If you have a question that your dealer is unable to answer, ask him to refer the question to Apple Technical Support. Apple Technical Support provides your dealer with Technical Notes, which answer commonly asked questions, and access to technical support specialists.

Your dealer has the latest information on new hardware and software products and will keep you informed about any product updates. If you want to upgrade your system, your dealer can help you select compatible components.

For service and support, look to your full-support dealer!

AppleCare

When you first purchase your Apple computer, it comes with a warranty. So you don't pay for parts or labor if a repair is needed; there are no unanticipated service expenses. You can add one year to this protection with our fixed-cost, carry-in service plan—AppleCare. It combines convenient service with fast turn-around.

AppleCare Carry-In Service is the lowest-priced service package in the industry. And your AppleCare agreement will be honored at all Apple Authorized Service Centers within the country of purchase—added insurance should you relocate. Local service means time saved in getting your Apple back to work. Ask your Apple dealer for details.

You may purchase AppleCare at any time. But for uninterrupted protection, it's a good idea to buy it along with your system. Besides providing you with the most complete coverage, purchase with your system avoids an owner-paid dealer inspection of your system if your warranty has expired.

AppleCare is available through your Apple dealer. Protect your Apple—ask for AppleCare.

Glossary

accessory: Another word for **peripheral device**—something you attach to the computer (like a printer or a joystick) to make it a more powerful or playful machine.

Apple II: A family of computers. The granddaddy of the family, the Apple I, was invented in a garage in California. The newest and most compact addition is the Apple IIc, a transportable Apple II.

Applesoft BASIC: The Apple II dialect of the BASIC programming language. See **BASIC.**

application software: Programs designed for a particular purpose (such as home finance, education, word processing).

back up: To make a spare copy of a disk. (It's a good idea to make backup copies of all your important disks.)

BASIC: Short for **Beginners All-purpose Symbolic Instruction Code.** The most popular computer language for personal computers. It's built in to your Apple IIc.

bit: The smallest item of useful information a computer can handle. Usually represented as a one or a zero. Eight bits equals one byte.

boot: Another way to say **start up.**

bug: An error. The expression comes from the early days of computing when a moth flew into a room size computer and caused a breakdown.

byte: A sequence of eight bits that represent an instruction, a letter, a number, or a punctuation mark.

catalog: A list of all the files on a disk. Sometimes called a **directory.**

chip: A small wafer containing thousands of microscopic components.

circuit board: A collection of integrated circuits (chips) on a board.

command: A word or character that causes the computer to do something.

compiler: A computer program that translates a language, such as Pascal, into a language the computer can understand. A compiler translates the entire program just once. Compare **interpreter.**

computer: A machine that processes words and numbers faster than a food processor can slice potatoes. Not particularly creative or intuitive, but very good at repetitious tasks.

contrast knob: A dial on your video monitor that lets you adjust the brightness on the screen.

CONTROL: A key on the Apple keyboard that when pressed in conjunction with another key makes that other key behave differently. It controls the operation of other keys.

copy protect: To prevent someone from duplicating the contents of a disk. Compare **write protect.**

cursor: A blinking underline, rectangle, or other symbol that marks your place on the screen.

data: Information, especially raw or unprocessed information.

data base: A type of application program that helps you keep track of lists of information. Makes it easy to recall, update, and cross-reference information. (Also known as **data management.**)

data disk: A disk containing your work—letters, budgets, pictures, and so on.

default: A recommended response to a question in a program. The response will be used by default unless you supply an alternative.

device: Short for **peripheral device.** A machine attached to your computer, such as a printer or a modem.

directory: A list of all the files on a disk. Sometimes called **catalog.**

disk: A circle of flexible plastic coated with iron oxide (the same sort of thing they make cassette tape out of). You can buy programs prerecorded on disks, and you save your work on blank disks.

disk controller card: A circuit board that provides a connection between other models of the Apple II and one or more disk drives. This connection or **interface** is built into the Apple IIc.

disk drive: A device that loads information from disks into the memory of the computer and saves information from the memory of the computer onto a disk.

Disk Use light: A light that comes on when your disk drive is loading something from or storing something on a disk. When the light is off, it's safe to put disks in and take disks out of the drive. When the light is on, don't open the disk drive.

display: A general term to describe what you see on your screen when you're using a computer.

DOS: Short for **Disk Operating System.** See **operating system.**

dot matrix printer: A type of printer that forms characters with patterns of dots.

Dvorak keyboard: An alternate keyboard layout, also known as the **simplified keyboard.**

80-column text card: A circuit board used in other models of the Apple II to double the number of characters across the screen. This capability is built into the Apple IIc.

80/40 Column switch: A switch that controls the number of horizontal columns or characters across your screen. A television can display a maximum of 40 characters across, while a monitor can display 80 characters across the screen.

envelope: A paper sleeve that protects disks when they're not in use. Compare **jacket.**

error message: The computer's way of alerting you to a failure in the communication process. Often accompanied by a beep.

file: A collection of information that you store on a disk.

file management: A general term for copying files, deleting files, and other housekeeping chores involving the contents of disks.

firmware: Another name for the programs in ROM (**read-only memory**). It's more permanent than the software in RAM (**random-access memory**)—thus the name.

flexible disk: Another name for **floppy disk.** See **disk.**

floppy disk: Disks are called **floppy disks** or **floppies** because they're made of flexible plastic.

format: To divide a disk into sections where information can be stored. Disks must be formatted before you can save information on them. Also called **initializing.**

FORTRAN: Short for ***For*mula *Tran*slator.** A computer language used mainly for scientific applications.

graphics: A fancy word for computer pictures.

hand controls: Computer accessories that move creatures and objects in game programs.

hardware: Those parts of the computer that you can see and touch. The computer and the machines that attach to it: the disk drive, printer, and other peripheral devices. Compare **software.**

initialize (a disk): To prepare a disk so the computer can store information on it. Another word for **format.**

input/output: Abbreviated **I/O**. Refers to the means by which information is sent between the computer and its peripheral devices.

integrated circuit: Networks of microfine wire that conduct electrical impulses. They are etched on silicon wafers and embedded in black plastic.

interactive guide: Combines book, disks, and the computer for personal instruction.

interface: Hardware or software that links the computer to a device.

interface card: See **peripheral card.**

interpreter: A computer program that translates a language, such as BASIC, into a language the computer can understand. An interpreter translates the program each time you run the program. Compare **compiler.**

jacket: A square of plastic that protects a flexible disk. You don't remove the jacket (and expect to ever use the disk again). Compare **envelope.**

joystick: An accessory that moves creatures and objects in game programs.

K: Short for **kilobyte.** It's how computer memory is measured. The Apple IIc has 128K of RAM (**random-access memory**) and 16K of ROM (**read-only memory**). One K is equal to 1024 bytes.

keyboard: Your way of communicating with the computer. It looks like the keyboard on a typewriter, but programmers can make the keys do anything they want them to.

Keyboard switch: A switch above the keyboard that allows you to use an alternate character set—the Dvorak, or simplified, keyboard.

label: A strip of paper you stick on a flexible disk to identify it. The label is a good place to put your thumb when you pick up your disks.

load: To put data or programs into the computer from a disk.

logic board: See **main logic board.**

Logo: A computer language that encourages learning through discovery. Easy and fun to learn, but powerful enough for serious application programming.

main logic board: A large **circuit board** that holds RAM, ROM, the microprocessor, custom integrated circuits, and other components that make the computer a computer.

memory: Integrated circuits (chips) that store instructions for the microprocessor (the brain) of the computer. There are two kinds of memory: temporary memory (called RAM) and permanent memory (called ROM). **Random-access memory** depends on electricity, and when the power goes off, it goes away. **Read-only memory** does not.

menu: A list of choices.

microprocessor: The brain of the computer. The Apple IIc has a 65C02 eight-bit microprocessor.

modem: A device that links your computer to other computers and information services over telephone lines.

monitor: It looks like a TV, but it doesn't have channels. It displays instructions from the program to you and shows what you've typed into memory.

Monitor program: A built-in program that turns on the disk drive when you turn on the computer.

mouse: A pointing device.

operating system: A program that, among other things, controls the way information is loaded into memory, the way the computer works with the information, the way information is stored on a disk, and the way the computer talks to printers and other peripheral devices. ProDOS, DOS 3.3, and Pascal are three operating systems available for the Apple IIc.

oval cutout: An opening in the disk jacket through which the disk drive read-write head accesses the disk.

parallel: A printer or other device that receives data eight bits at a time. Compare **serial.**

Pascal: A programming language taught in high school and college computer science courses because it stresses a systematic approach to problem solving.

peripheral card: A circuit board you plug into other models of the Apple II to link the computer to a peripheral device. The **interfaces** for most popular peripheral devices are built into the Apple IIc.

peripheral device: A device that is connected to the computer, like a printer or a modem.

plotter: A device that prints charts and graphs.

port: A connector on the back of the Apple IIc where you attach printers, hand controls, and other devices to your computer.

Power light: A light that tells you whether the machine is turned on or not.

power supply: A box that draws electrical power out of the power outlet and converts it to power the computer can use to do its computing.

power switch: A rocker switch on the back of the computer that you turn on when you want to use your computer.

printer: A device that produces a paper copy of the information you create using the computer.

program: (n.) Instructions that tell the computer what to do. (v.) To write instructions for the computer—to talk to the computer in terms it understands.

radio-frequency (RF) modulator: A device that transforms your television set into a computer display device.

RAM: See **random-access memory.**

random-access memory (RAM): Temporary memory. RAM stores programs and data for the microprocessor.

read-only memory (ROM): Permanent memory. Applesoft BASIC is stored in ROM.

ROM: See **read-only memory.**

run: Something programs do when the computer is carrying out their instructions.

save: To store a program or data on a disk (as opposed to storing it in the memory of the computer).

scroll: (v.) To move all the text on the screen (usually upward) to make room for more text.

sector: When disks are formatted, they are divided into **tracks** and **sectors.** A sector is part of a track.

serial: Things occurring one after another—like soap operas. A serial interface means data is sent one bit at a time. Compare **parallel.**

simulation: A computerized representation of something in action.

simplified keyboard: The Dvorak keyboard.

65C02: The type of microprocessor (or brain) used in the Apple IIc.

slots: Long, narrow connectors inside other models of the Apple II that let you connect printers and other devices to the computer.

software: Instructions that tell the computer what to do. They're usually stored on disks. Compare **hardware.**

software directory: A book that lists available software.

spreadsheet: A type of application program that simplifies financial planning, cost estimating, and other number-crunching tasks. It is laid out in columns and rows.

startup disk: A disk containing an operating system and a self-starting program.

store: To file away for safekeeping. (Something you have to do with data you create using your computer. If you don't store your work on a disk, it will be lost forever when you turn off the computer).

traces: Electrical roads that connect the components on a circuit board.

track: When disks are formatted, a series of concentric circles are magnetically drawn on the disk. Each of these circles is a track.

user group: A computer club where members exchange information.

video monitor: See **monitor.**

word processing: A type of application designed to make writing and editing easier and faster.

write-enable notch: A small, square cutout in the upper-right corner of the disk that indicates whether or not information can be recorded on the disk.

write protect: To prevent accidental changes to the contents of a disk by covering the write-enable notch. Compare **copy protect.**

write-protect tab: A piece of tape that you can use to cover the write-enable notch on a disk so information can't be recorded on it.

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Tell Apple

About the Apple IIc

Your Name: _____

Company: _____

Your Title: _____

Address: _____

_____

City/State/ZIP: _____

Apple uses comments and suggestions from Apple owners like you to improve existing products and develop new and better products. Now that you've used your Apple IIc, we want to know your thoughts and suggestions about your experience. Please use this form to tell Apple what you think.

Your Dealer Can Help: Apple can't respond to your individual questions. If you have a question, would like help, or need service, please contact your Apple dealer.

Part I: Tell Apple About You

1. How much prior experience have you had using computers?
   ☐ None ☐ Little ☐ Moderate ☐ Extensive
2. Where do you use your Apple IIc?
   ☐ Home ☐ Work ☐ Home and Work
3. Did you own an Apple II or Apple IIe before buying an Apple IIc?
   ☐ Yes ☐ No
4. How many people in your family use your Apple IIc?
   ☐ Adults ☐ Children

Part II: Tell Apple About Your System

1. Which devices are attached to your system?
   ☐ Disk Drive ☐ Mouse ☐ Printer ☐ Plotter
   ☐ Joystick ☐ Hand Controller
   ☐ Other(s) _____
   (please specify)
2. Which type of display device are you using? (Please check two boxes.)
   ☐ Video Monitor ☐ Television
   ☐ Black & White ☐ Monochrome ☐ Color
3. Do you plan to write computer programs? ☐ No
   ☐ Yes. If yes, which computer language(s) will you use? _____
4. What application programs do you use or plan to use with your Apple IIc?
   ☐ Word Processing ☐ Data Management
   ☐ Spreadsheet ☐ Education ☐ Games
   ☐ Communication ☐ Graphics ☐ Other: _____
   _____
5. Please list products (program, operating system, or language) in use. Please include version number.

Exact Name of Software	Version Number (if applicable)	Product Number

6. Please give us any suggestions or comments and tell us about any problems you've had with your Apple IIc system. Feel free to attach additional sheets.

Part III: Apple IIc Interactive Owner's Guide

Please take a few minutes to tell Apple what you thought of the interactive guide and where you plan to go from here.

1. What did you like best about the guide? _____
2. What did you like least about the guide? _____
3. Which topics, if any, were confusing to you? _____
4. Which topics, if any, were not explained thoroughly enough? _____
5. Did you read the guide from cover to cover and try every disk? ☐ Yes ☐ No. If no, which topics or disks did you skip? _____
6. Was the information presented appropriately for your level of computer expertise? ☐ Too Elementary ☐ Just Right ☐ Too Complex
7. Please describe specific problems you encountered in the guide. (Page numbers would be helpful. Feel free to attach additional sheets.) _____

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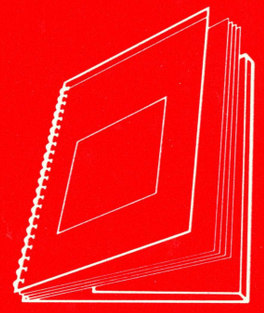

Tuck end flap
inside back cover
when using manual.

Apple Presents the Apple IIc

The Apple II

apple computer

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